

THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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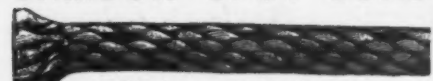
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Adv., Page 15



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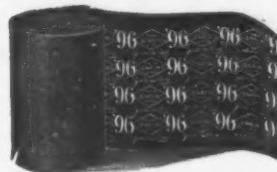
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THE IRON AGE

New York, Thursday, November 8, 1906.

A Modern Car Wheel Casting Plant.

The Straight Floor System Employed in the Chicago, Milwaukee & St. Paul Railroad Company's New Foundry at West Milwaukee, Wis.

Specialization in foundry practice has reached a high development in the making of cast iron car wheels, as this work allows continuity of operation and the introduction of labor saving devices, to be had only in multiplicate casting requiring not more than occasional minor pattern changes. The straight and circular floor systems are most generally used, present practice seeming to favor the former, which has been introduced in most of the plants recently erected in this country and Canada. Hand

wheel foundry of the Chicago, Milwaukee & St. Paul Railroad, West Milwaukee, Wis., until after careful consideration was given to all the other available methods by A. E. Manchester, superintendent of motive power, and after personal inspection of the modern plants by J. F. De Voy, the company's mechanical engineer. The adoption of this system marked the reversal of car wheel practice at these shops, as the old wheel foundry operated seven circular floors, 26 wheels to the floor, with a total



Fig. 1.—A View in the New Car Wheel Foundry of the Chicago, Milwaukee & St. Paul Railroad Company at West Milwaukee, Wis.

molding is practiced in both, the circular floor being commanded by either a hand or power jib crane, while the straight floor is provided with an overhead trolley hoist which travels the length of the floor. In a large plant recently completed near Chicago circular floors have been commanded by overhead trolleys for carrying the metal from the cupolas, which, in a measure, is a combination of the two systems. A continuous process described in *The Iron Age* January 4, 1906, which includes machine molding, is in successful operation at the Terre Haute, Ind., plant of the American Car & Foundry Company, and still another method is in use at a Pittsburgh plant which is similar to the one just referred to, providing for the continuous pouring of the castings, but the molds are made by hand. The flasks are carried on cars on a circular track, whereas the track at Terre Haute is rectangular, but the sand in both is delivered to the machines and molders by conveyors. There is no need for the latter on the straight and circular floors.

The straight floor system was not adopted for the new

capacity of 182 wheels daily. The new plant has a capacity of 600 wheels, and the old circular floors have made room for much needed extensions to the gray iron foundry.

The entire power equipment, with the exception of the pitting cranes for this system, was installed by the Whiting Foundry Equipment Company, Harvey, Ill., and many changes and improvements suggested by similar installations made by this concern have already been justified. The foundry is divided into 24 floors of 24 wheels each, extending across the building, as shown in Fig. 1. It is of brick and steel construction throughout, 328 ft. 8½ in. long, with a lean-to 31 ft. 5 in. wide and 332 ft. 8½ in. long, which contains the wheel stacking room, corerom and cupola house. A brick curtain wall separates the corerom and cupola house from the remainder of the foundry, and the blower room, which is on a level with the cupola platforms, is entirely inclosed and is provided with a concrete floor. The 24 floors occupy a space 128 x 288 ft., while the cupola house is 31 x 96 ft. 5 in. A narrow gauge track outside the building by means of

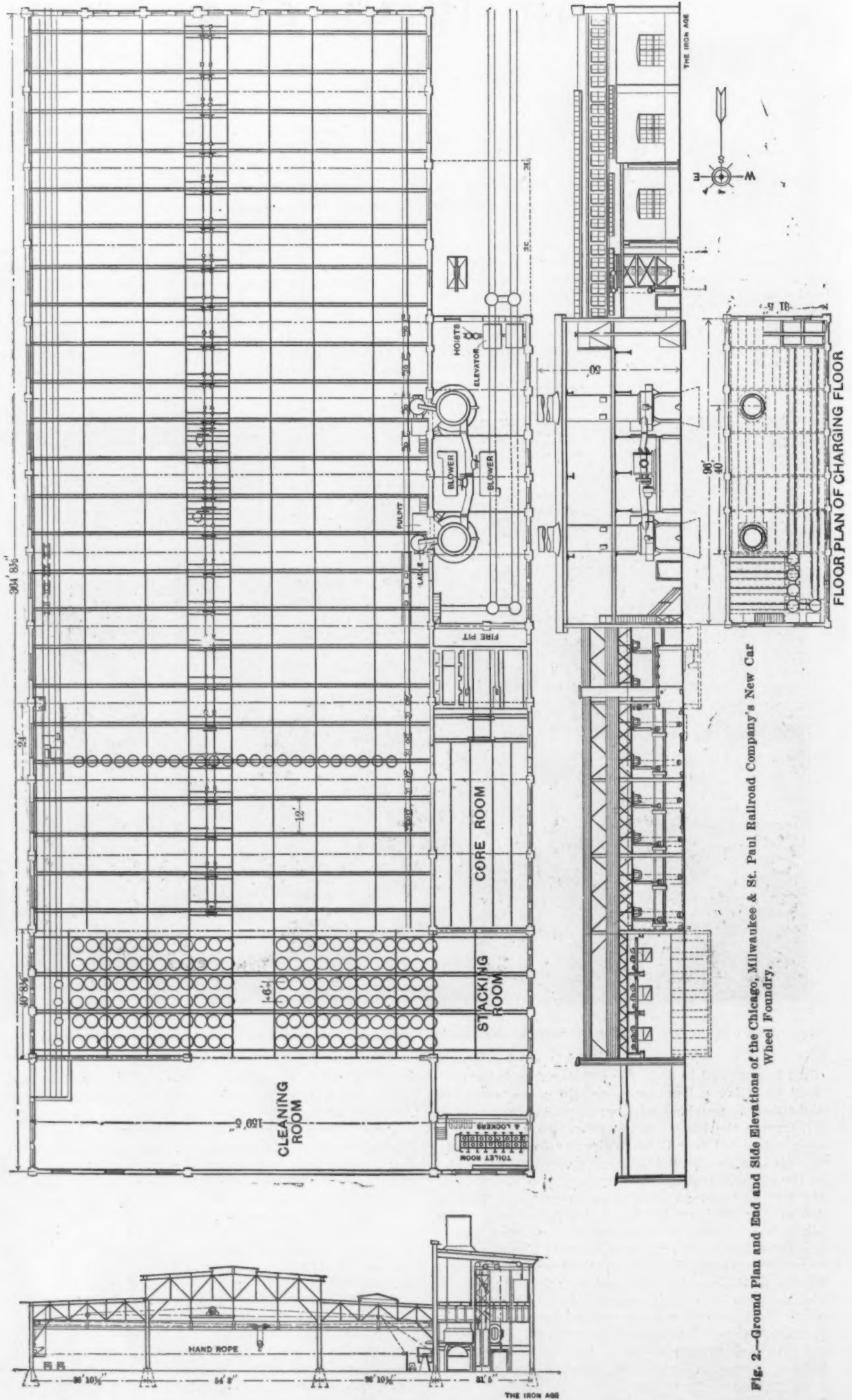


Fig. 2.—Ground Plan and End and Side Elevations of the Chicago, Milwaukee & St. Paul Railroad Company's New Car Wheel Foundry.

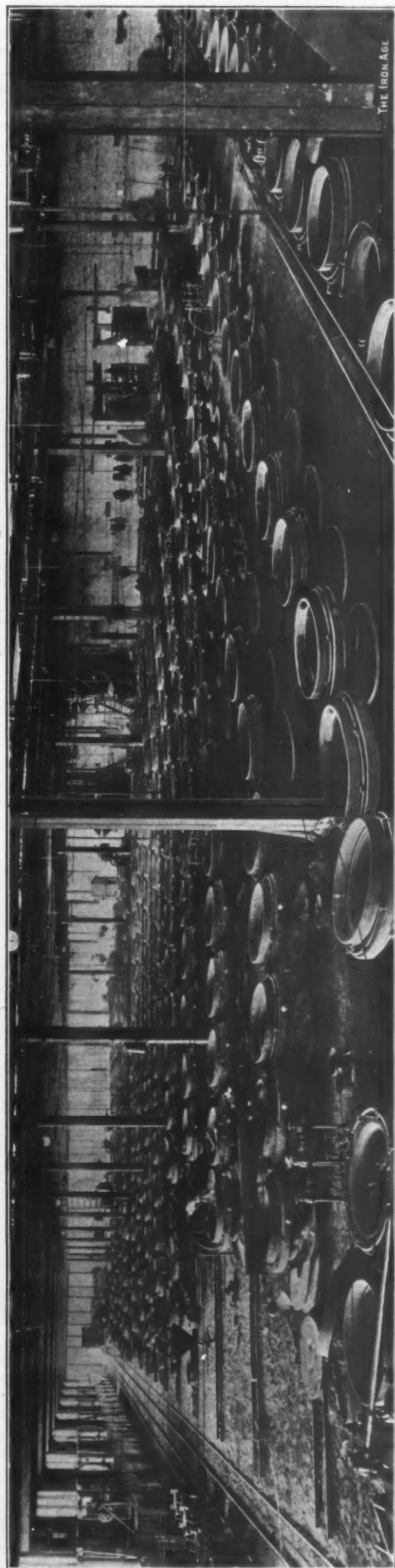


Fig. 3.—A General View in the Foundry.

turntables connects the hot wheel and hot metal tracks with the tracks in the pig iron and old wheel storage yard. Over these tracks the heads which are knocked off the wheels into the pit at one end of the annealing floor are conveyed on buggies to the storage yard, where they are used for making up charges for the cupolas.

The iron is melted in two cupolas located in the lean-to at one side of the building, opening into the foundry about midway of its length. The ladle track is directly in front of the cupolas, while the hot wheel track is on the opposite side, as may be seen on the ground plan, Fig. 2, and also in the general view, Fig. 3. The cupolas practically divide the foundry into halves, and each has a capacity sufficient to serve 12 floors. Above each floor is a traveling trolley, from which a block and hook controlled by a pneumatic hoist at one end is suspended. The cylinder and valves for the hoist being supported on the wall on the side of the foundry opposite the cupolas are out of the way of the dust and dirt of the foundry floor. For this work a compressed air equipment was considered more desirable than electrically operated hoists located directly over the floor. It is expected that the Barr contracting chill will be used, therefore each molder has two helpers, although at present the steam and hot water are not being used, and if the mileage on the wheels now being made proves satisfactory the steam and hot water will be discarded and only one helper will be required for each floor.

As shown in Fig. 1 the trolley hoists are used for turning the flasks, and for pouring off, as shown in Fig. 4. In shaking out the wheel is gripped on the side and carried across the floor to the hot wheel buggies, as shown in Fig. 5. Two trains of hot metal cars operate on a narrow gauge track, each traversing half the length of the foundry on the cupola side. Each train is made up of four cars, and is moved by a rope haulage system operated by a 20-hp. Northern motor, controlled by the operator in charge of the receiving ladle. Each car will hold two ladles, one loaded ladle being placed at one end, leaving room for an empty ladle at the other end. These ladles have a pouring capacity of 1000 lb. each.

After the wheel has cooled sufficiently it is shaken out, and upon being gripped on the edge by tongs depending from the hook of the hoist the loose sand on either side which does not fall away when the wheel is raised can be easily knocked off with a sledge. Methods generally in use provide for gripping the wheel flat at three points and shoveling off the hot sand from the top and rapping it from the bottom. This edge grip also places the wheel in position for depositing it on the hot wheel buggies, which operate in two trains of four cars each on two narrow gauge tracks extending the length of the building. These buggies have a capacity of one wheel each and are operated by a rope haulage system similar to the one used for the hot ladle cars. Their movement is controlled by an operator in the stationary pulpit which is attached to the side of the building and overlooks the tracks. Before the wheels are lifted from the buggies by the pitting cranes their heads are knocked off and center cores knocked out into a pit underneath the tracks.

All of the annealing pits are located at the north end of the foundry and occupy a space approximately 40 ft. 3 in. by 125 ft. They are 6 ft. between centers and are 144 in number, being 36 in. in diameter, and have a capacity of 16 wheels each. The annealing floor is 4 ft. 3 in. above the foundry floor, and has a concrete retaining wall. The pits are of steel plate, lined with fire brick, with a double layer in the bottom. The pits are served by three special 1-ton three-motor electric traveling cranes, designed and built by Pawling & Harnishfeger, Milwaukee, shown in Fig. 6. Each crane serves two rows of pits, being equipped with two 1000-lb. hoists having center bore tongs, by which the wheels are lifted from the buggies and deposited in the pits to be annealed. The crane bridges are of channel construction riveted together, with two axle boxes supported in channels that form the ends of the bridges. There are cross shafts on both sides of the bridge to which the wheels are keyed, the latter being chilled and ground true. The bridge drive motors are fastened to the sides of the bridges, and drive one of the cross shafts through two reductions of gearing. A brake,

consisting of two hinged shoes inclosing a band wheel, is keyed to the intermediate shaft of the bridge drive, and these shoes are manipulated by a toggle connection to the foot levers at the bottom of the cages. The bridges are thus under immediate control of the operator without the necessity of reversing the motor to stop the driving of the bridge. Suspended from and in the center of the bridges are the operator's cages that reach to about a foot from the top of the pits, permitting the operator to travel

extending through to receive the electric brakes that are attached to the opposite side of the gear cases. Machine cut spur gearing is used throughout and all bearings are bronze bushed. As the operator stands in the cage the three controllers are in easy reach, and when operating the tongs in the pit he is able to guide them into the cored hole of the wheel to be lifted.

Each of the 24 floor hoists consists of a traveler operating on elevated tracks and propelled by a double fric-



Fig. 4.—Pouring Off, Showing Method of Handling the Ladle.



Fig. 5.—Loading the Hot Wheel Buggies.



Fig. 6.—The Wheel Pitting Cranes, with a Near View of One in the Foreground.

with the work. A switchboard for the motors is fastened to the cage. The two 1000-lb. hoists are attached to the under side of each bridge, and are so located that the hoisting ropes and the bottom blocks hang directly over the center line of the pits, each crane serving two rows. The hoists are high speed, direct lift and are independent of each other. Steel castings bolted to the bridge channels support one end of the drum shafts and also make a base for fastening gear cases that contain all the hoist gearing and mechanical brakes, thus providing a rigid and self-contained construction. To one side of the gear cases are fastened the hoisting motors, the armature shafts

tion motor drive. The backward and forward movement of the traveler and the lift of the hoist are controlled by separate hand ropes suspended 6 ft. above the foundry floor, the traveling ropes being so arranged that a pull in either direction results in a like movement of the trolley. This assists the operator materially and is of inestimable value in the handling of the pouring ladle, when false moves are liable to result in serious accidents. The traveler drive is obtained from two overhead shafts extending the length of the foundry, geared together and operating in opposite directions, driven by two direct connected 15-hp. Northern motors. Either motor is of

sufficient capacity to drive all the trolleys, one being maintained for emergency, and if desired each can supply power to one-half of the floors. Friction wheels for each trolley are mounted on each shaft and a drum carrying the traveler rope is mounted on a shaft with a friction pulley, as shown in Fig. 7. This shaft is mounted in eccentric bushings, held in proper bearings, and is shifted by a lever to engage with either friction wheel, the hand rope being attached to this eccentric lever and supported on guide sheaves overhead.

The hoisting movement of each trolley is accomplished

second sheave, G, in the trolley, and then extends to the opposite end of the runway, where it is anchored at H. The air supply is obtained from a main line running the length of the foundry, and the exhaust is discharged into a special main. Both hand ropes are supported by bars with pulleys at their lower ends, and take the course over guide sheaves, as shown. At either end of the runway spring bumpers for the trolley are placed.

As shown in Fig. 8 the metal is tapped into 10-ton receiving ladles, which are tilted by 3-hp. Northern motors, operated from the pulpit by the same operator who

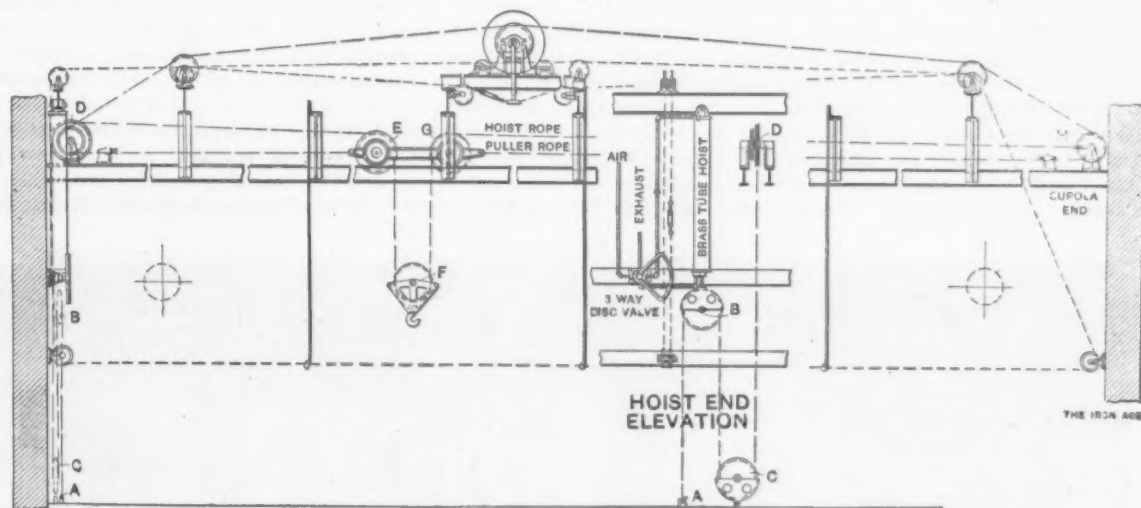


Fig. 7.—Details of a Floor Trolley and Operating Mechanism.

by an independent cylinder of the air balanced type, made of cold drawn brass tubing $7\frac{1}{4}$ in. in diameter, also shown in Fig. 7. It is provided with a top head, arranged for attaching to the building framework and a bottom head provided with a stuffing box for the piston rod. The valve is independent of the cylinder and is attached to the building framing, and is piped with a rigid connection to the cylinder. It is provided with a special controlling lever with a quadrant, to which the controlling hand rope



Fig. 8.—View of Cupola, Receiving Ladle and Operator's Pulpit, with Pouring Off Ladles on Cars in Front of the Cupola.

is attached. This rope extends the length of the floor and parallels the rope controlling the traveling movement. It is anchored at one end to the foundation at A, passes over a sheave at B at the end of the piston rod and under the guide sheave C, which is anchored to the building foundation at the floor level, and then passes upward in a plane of longitudinal travel to the guide sheave D, mounted on the runway beams, then over the sheave E in the trolley, through the hook sheave F, back over a

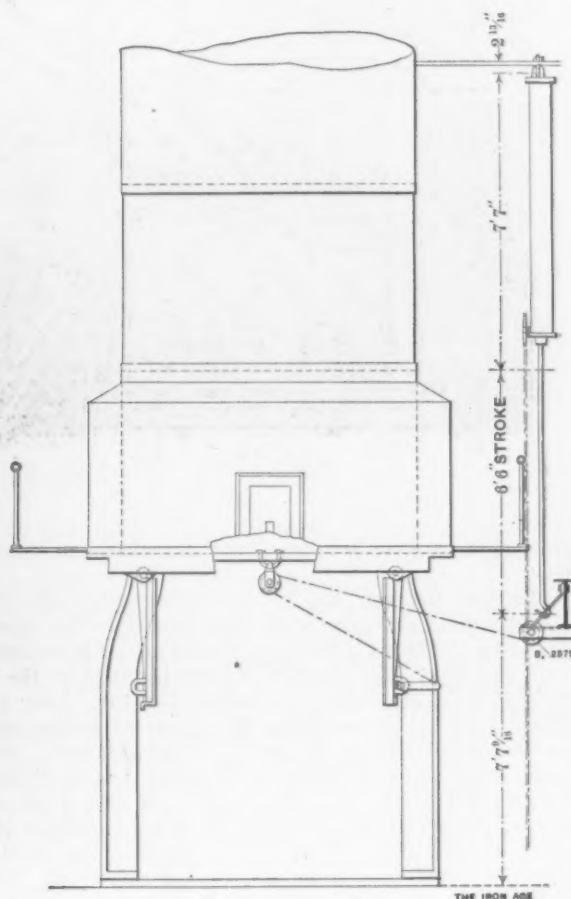


Fig. 9.—Hoisting Arrangement for Lifting Bottom Doors of the Cupola.

controls the hot ladle cars. The receiving ladles are equipped with skimming spouts and are provided with emergency hand power mechanism underneath the operator's platform, which is shielded by steel plate work, as shown.

The cupolas are of the standard Whiting type, 96 in. in diameter and lined to a diameter of 78 in. Each has a wind box 118 in. in diameter, and the height from the floor level to the top of stacks is 50 ft. The cupolas are

so located that each one can conveniently serve 12 of the floors. The total melt of the two cupolas is about 220 tons, or at the rate of 20 tons an hour each. They also are provided with operators' platforms, which likewise serve as a platform for the tapper.

The cupola charging floor, as shown in Fig. 2, is 31 x 96 ft. 5 in., and is served by two pneumatic elevators of 4 tons capacity each, having 20-in. cylinders with 11-ft. stroke and a lift of 22 ft. Each elevator has a steel cage 6 x 8 ft., and is provided with tracks on which coke and pig iron and scrap charging buggies are carried from the ground floor to the charging room. In addition to the two main tracks there are four storage tracks on the charging floor on which coke and metal can be stored while the heat is in progress. These storage tracks are located on the north end of the floor, and turntables are conveniently located so that both cupolas are amply provided for. The cupolas are provided with large charging doors. The floor is amply lighted and well ventilated. In addition to the pneumatic elevators the floor can be

a wheel fastened to the cupola support, and the upward movement of the hook raises the door in place. When raised each door is held in position by a screw prop bearing on a cast iron base underneath the cupola. When both doors are in place a solid steel prop is wedged in between the screw props at a point underneath both doors. Before dropping the bottom the screw props are loosened and removed. The solid prop is then caught by a hook having a long handle, and as it is only held in place by a wedge it is easily pulled out.

The slag and cinder which is dropped after being quenched is permitted to remain over night and removed the next morning. To facilitate the handling of this material a narrow gauge track runs the entire length of the floor of the cupola house, on which cinder cars are operated.

The pig iron storage yard parallels the west side of the foundry, and is well provided with narrow gauge tracks over which the charging buggies are transferred to the elevators to be lifted to the cupola charging floor.



Fig. 10.—Coreroom and Core Ovens.

reached by a steel staircase from the charging department.

Located between the two cupolas underneath the charging floor and practically on a level with the cupola operating platforms is the blower room, which is equipped with two No. 7 high pressure blowers installed by the P. H. & F. M. Roots Company, Connersville, Ind. They are direct connected to two 60-hp. direct current motors built by the Northern Electrical Mfg. Company, Madison. The blast main, which is 24 in. in diameter, passes directly between the two blowers and is provided with a cut off, so that either blower can be used for either one of the two cupolas. The piping is almost in a straight line, having only one slight turn from each blower connection. The speed of the motors is regulated by a universal speed regulator installed by the Cutler-Hammer Mfg. Company, Milwaukee, by which the operation of the blowers can be adjusted and maintained as desired. The blower room is entirely inclosed, and has doors leading to it from each of the cupola platforms, thereby giving the operator ready access to the control of the blast.

A most ingenious device has been arranged for closing the bottom doors of the cupola, as shown in Fig. 9. This consists of a vertical air hoist with a chain attachment at its lower end. In lifting each door the chain is attached at one end to an eye in the center of the door, passed over

There are also two narrow gauge tracks on the old storage platform which adjoins the wheel breaker where the broken wheels are weighed and placed on the charging buggies preparatory to being raised to the charging floor. The wheel breaker is provided with a 2000-lb. cast iron drop, which falls from a height of 12 ft., being raised by a 12-in. air hoist attached to the side of the framework, which is of heavy steel construction. In operation the tongs at the end of the rope attached to the hoist grasp the drop at the bottom and are automatically released at the top, permitting the weight to fall.

The corerooms, together with the core ovens, are located in the lean-to adjoining the cupola room and cover an area of 96 ft. long and 31 ft. 5 in. wide. As shown in Fig. 10 two 6-ft. gauge tracks extend practically the length of the room to the transfer table, from which the core buggies are moved into the ovens. This table operates on a track 6 ft. 11½ in. wide, and occupies a space 8 ft. wide. As there are three core ovens, which occupy the entire space at one end of the room and only two tracks in the shop, the transfer table was necessary, but it also aids materially in the shifting of the buggies, permitting those containing the dried cores to be shifted onto one track while the wet cores on other buggies are being charged into ovens just emptied.

The sand shakers, electrically driven, are located in

one end of the shop, with the coremakers' benches in close proximity. As shown in Fig. 11, the cores after being dried are distributed to the various floors on platforms set on the ladle cars. In this way the handling of the cores has been reduced to a minimum and the breakage thus far is almost *nil*. The movement of these cars is controlled from the cupola pulpit the same as the hot ladle cars when pouring off. The roofs of the core ovens, which are of concrete, are used for storage purposes, as shown in Fig. 10, and provide ample room for carrying the necessary stock of cores to provide against any emergency that may arise.

The core ovens are coke fired from the rear, are 9 ft. 3 in. wide, 18 ft. long and 7 ft. high and can hold two buggies at a time. The core oven doors are of steel plate construction and are counterbalanced, the operating device consisting of a shaft attached to the stationary framework and fitted with sprocket wheels carrying chains attached to the door at either side. It is operated by a hand chain passing over a wheel keyed to the shaft

F. Loweth, superintendent of bridges and buildings of the Chicago, Milwaukee & St. Paul Railroad, and the foundry is operated by Adam W. Bair, superintendent of foundries, with E. H. Bair, assistant.

The Central Supply Association Visits the Lorain Works.

The members of the Central Supply Association, while in session at Cleveland, Ohio, the last week in October, were invited by the National Tube Company to visit its large new Lorain Works. The party left Cleveland on Thursday morning of that week at an early hour, taking special trolley cars which conveyed them directly to the plant at South Lorain, located about 20 miles from Cleveland. The visitors were taken to the ore docks, where many of them for the first time saw the modern appliances by which ore vessels containing as high as 10,000 tons are unloaded in a few hours. The four blast



Fig. 11.—Ladle Cars with Platforms for Carrying Cores to the Different Floors.

on its outer end. This adjustment prevents all binding of the doors and insures a positive lift. There are eight core oven cars constructed of steel bars, angles and channels. They are 8 ft. long, 6 ft. 11 in. wide and 5 ft. 9 in. high and contain six shelves on which the center and pan cores are arranged.

Adjoining the annealing pits is the cleaning room, which occupies a space of 36 x 128 ft. of the old car wheel foundry and in which were formerly contained the annealing pits for this plant. After the wheels are annealed they are lifted out of the pits by cranes and rolled by hand to the cleaning room, although their transfer is to be accomplished later on buggies.

At one end of the cleaning room a space, approximately 18 x 32 ft., has been fitted up as a toilet and locker room for the men employed in the plant. On the main floor are the water closets, 16 in number, and on the floor above are the lockers, together with 12 shower baths, each compartment being provided with an enameled washstand. These compartments are sufficiently large to permit two men to bathe in them at the one time, thus providing bathing facilities for 24. Each man will be provided with an individual locker having two keys, one being kept by the foundry superintendent, so that in case the other is lost there will be no necessity of breaking the locks.

The building was designed under the direction of C.

furnaces next received attention, a 10,000-hp. blowing engine being of special interest. The Bessemer steel plant, containing two 12-ton vessels, was the next department to be inspected, after which the party was shown through the skelp and pipe mills. In this portion of the plant the visitors were especially interested, as the Central Supply Association is composed of manufacturers and jobbers of plumbers' supplies and therefore among their number are many who handle pipe extensively. The Lorain Works has the distinction of being by far the largest pipe mill in the world. The equipment of this plant is of the most improved character, and the immense size of the establishment, together with the perfection of the labor saving devices employed, made a profound impression. At noon a luncheon was served in the general dining room of the main office building, after which an impromptu address was made by William E. Clow of James B. Clow & Sons, Chicago, on behalf of the visitors, a response being made by James H. Downer, assistant general sales agent of the National Tube Company. The party returned to Cleveland in the evening, having by unanimous consent passed a most pleasant and instructive day.

The public debt of the United States on October 31, deducting cash in the Treasury, was \$952,171,364. The available cash balance was \$223,300,810.

The Case Ash Handling Bucket.

In *The Iron Age*, October 18, 1906, was described a crane installation for handling locomotive ashes in the yards of the Pennsylvania Railroad Company at Dennison, Ohio. This plant requires the use of special buckets of the clam shell type, herewith illustrated.

As stated in the previous description the buckets are placed in pits beneath the tracks, as shown in the cross section of one of these pits given in Fig. 1. A narrow gauge track is placed at the bottom of the pit on which run trucks of special construction for holding the buckets. This arrangement, it will be seen, allows the bucket to be positioned at any part of the pit after the locomotive has been brought to a stand over the pit, and if the latter is of sufficient length two locomotives coupled together may discharge their ashes without moving the train.

The drawings give a clear understanding of the construction and operation of the bucket. The sides of the

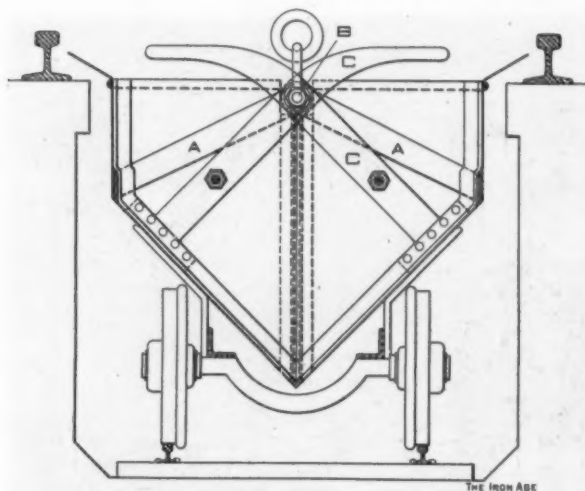


Fig. 1.—The Bucket in the Pit Ready to Be Filled.

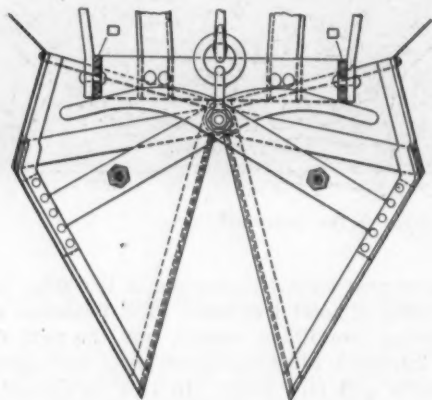


Fig. 2.—The Bucket Raised by the Crane and Dumping.

bucket are of $\frac{1}{4}$ -in. plate steel reinforced with angles at the center and ends. Two flat bars, A and A, embrace the two halves of the bucket, their ends being turned inward and pivoted together at B, where a bolt passes through them forming a hinge. Two levers, C, at the center of the bucket are similarly hinged on the bolt B. At the latter point a shackle is provided with a ring by which the bucket is lifted. When it is desired to empty the bucket the crane hook is lowered and inserted in the ring, and the bucket is raised from the pit and carried to a point over the car into which the ashes are to be deposited. The hoisting movement, being then continued, the bucket is elevated until the upper ends of the levers C come in contact with a heavy iron ring, D, as shown in Fig. 2. This ring is concentric with the hoisting chain and is rigidly supported from the crane trolley. As the bucket continues to rise the angle between the arms of the levers C is increased causing the two sides of the bucket to

spread apart allowing the contents to be discharged by gravity. The form of the bucket is such that it will normally remain closed when suspended, and the shape of the bottom where it rests on the trucks insures its remaining closed while being filled.

The entire installation was designed and built by the Case Mfg. Company, Columbus, Ohio. A similar plant was installed at Harrisburg, Pa., for the Pennsylvania Railroad Company, and both equipments have been so successful in their operation that the system promises to grow in favor with railroad engineers, due to its great simplicity and flexibility.

Sand and Gravel Production in 1905.

The total production of sand and gravel reported to the United States Geological Survey in 1905 was 23,174,967 net tons, valued at \$11,199,645, an average value per ton of 48 cents, although the value varied from six cents to \$6 a ton, according to the use to which the sand was put. The total given above included 1: Glass sand; 2, molding sand; 3, building sand; 4, fire, engine, and furnace sand, and 5, sand used for many miscellaneous purposes. Sand used in the manufacture of sand lime brick is not included in these figures, nor the large quantity of sand used by railroads for filling and ballast, the value of which is exceedingly small.

The glass sand, including sandstone ground into sand, produced in 1905 was 1,030,334 net tons, valued at \$1,083,730; the figures for 1904 were 858,719 net tons, valued at \$796,492. Sand for glass making is required to be purer than sand for any other purpose, with the consequence that glass sand is higher priced than other sands, the price and purity, however, depending upon the quality of glass desired.

The molding sand produced in 1905 amounted to 3,084,098 net tons, valued at \$2,102,423. In 1904 these figures were 3,439,214 tons, valued at \$2,125,370, a decrease in 1905 of 355,116 tons in quantity and of \$22,947 in value. Molding sand includes core and pig bed sand as well as sand for steel, brass and iron and a small quantity of sand used for molding brick and pottery. The value of this sand varies greatly. Many small foundrymen who own a bank of sand find it capable of answering ordinary purposes, and the value of such sand is never estimated, since it amounts simply to the time and labor required to dig and haul it to the foundry. On the other hand, great care has to be taken in the selection of sand suitable for fine casting and for heavy castings.

The output of building sand reported in 1904 was 4,501,467 net tons, valued at \$1,783,749. In 1905, with a much more complete canvass, the production reported was 10,127,750 tons, valued at \$4,284,740. This includes the sand used for mortar and plaster as well as the sand used in making concrete structures, the demand for which has been exceptional during the past four or five years.

Fire sand, engine sand, and furnace sand are varieties distinct in kind and in the uses to which sand is put, and each kind increased in quantity and value of output in 1905 as compared with 1904.

Gravel used in concrete work, road making, roofing, &c., was reported to the value of \$1,800,657, which represented 4,422,856 net tons of material, the low average price being due to the fact that large quantities were used for ballast and filling on railroads and highways. Gravel as roofing material has an average price of 75 cents to \$1 per ton.

The H. W. Johns-Manville Company, New York, has leased the building at 55-59 High street, Boston, and will remove its Boston office from 77 Pearl street to the new quarters soon after December 1. The entire building, running through from High to Purchase street, is included in the lease and is being completely remodeled to adapt it to the company's special requirements. The steadily increasing business of the Boston office has compelled larger quarters, and when installed in the new building the company states that it will be in a better position to show its goods and give all orders careful and prompt attention.

An Albree Boiler Riveter Installation.

Needful as is a large riveting machine in a boiler or structural iron shop it is not always convenient or expedient or a warranted expense to install the standard vertically set riveter, with its tower and building, crane and runway, electrical equipment and other accessories. For small shops where such conditions obtain an equipment similar to the one illustrated is especially useful. It is patterned in a measure after the practice that is common in Germany of suspending a riveter from a specially built trestle, and has been worked out and built by the Chester B. Albree Iron Works Company, Allegheny, Pa.

The engraving shows an installation for a boiler

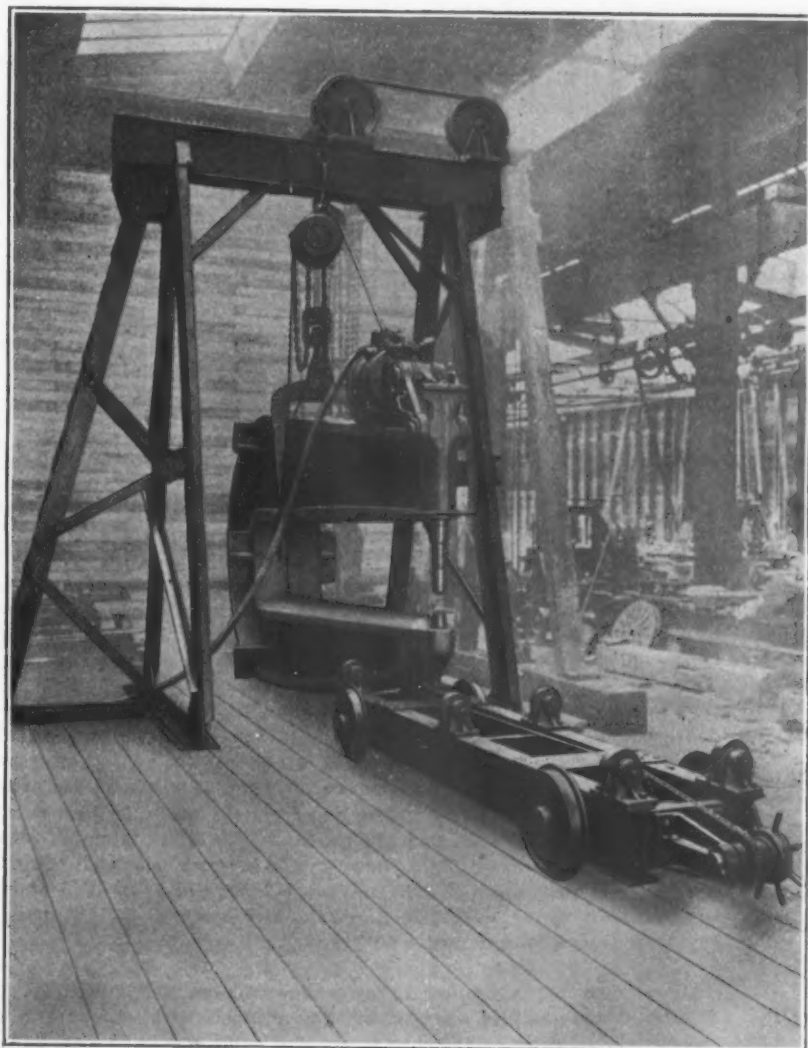
hose is used, and the exhaust is released directly into the air.

The air riveter is claimed to be increasing in favor for large work, the argument for pneumatic as opposed to hydraulic power being that a tighter rivet is secured because the maximum squeeze comes at the end of the stroke, giving the rivet body time to swell and fill the hole. Such steady increase of pressure throughout the stroke, it is averred, cannot be obtained with a hydraulic machine. Another contention is that the air machine, with its small volume of low pressure air giving high pressure by leverage, requires about one-fifth as much power per rivet as a hydraulic machine. Equipping a hydraulic machine with cylinders of different sizes for various sizes of rivets is cumbersome. No corresponding makeshift is necessary in the air machine, for it has a

reducing valve that will give any pressure, and hence the right pressure on a rivet of given size.

The air riveter will perhaps consume on the average 50 cu. ft. of free air per minute, corresponding to about 10 hp., and valuing horsepower at \$40 a year, running day time only, the cost for power approximates \$200 a year. The power bill on a corresponding hydraulic machine, it is claimed, would be about \$1000 per year. Of course in practice a machine will not run steadily throughout the year, but where any reasonable amount of work is done it is believed that 25 or 30 per cent. of the original cost of the machine can be saved each year.

The combination therefore of an air machine with a trestle not only gives satisfactory results in working facility, but it can be both installed and operated cheaply.



Large Horizontal Riveter Installation, Built by Chester B. Albree Iron Works Company, Allegheny, Pa.

plant comprising a 126-in. gap riveter suspended from a trestle, with a specially built truck for holding a boiler while it is being riveted. The truck can be shifted longitudinally by applying a pipe on the spokes of a windlass, which is connected by sprockets and chain with one of the axles, and the riveter being counter-balanced can be easily raised or lowered by hand with a small chain block.

The cost of such an installation is stated to be about one-quarter that of a hydraulic riveter, with high pressure pumps, lines, valves, accumulators, usual steel tower, crane, runway, &c., and about one-half that of the usual stationary compression riveter installation for the same work, where the riveter is placed vertically. In this case the riveter used is a pneumatic riveter, doing away with the necessity for carrying water under high pressure in flexible pipes, and providing means for taking away the exhaust water. With this riveter light, flexible

is the "Bureau of Standards." On January 7, 1907, John F. Brown of the Damascus Bronze Company, Allegheny, Pa., will speak on the subject of "Brass Mixtures." On February 4 the subject of "Foundry Irons Manufactured by Present Methods" will be discussed, the speakers to be announced later. On March 4 the subject for discussion will be "Cupola Daubing Fluxes," the speakers to be announced later. On April 1 the subject will be "Foundry Costs," and on May 6 the association will give a banquet and discuss the trip to Philadelphia for the June meeting of the American Foundrymen's Association. On June 3 the members of the association will take a trip to the plant of the S. Obermayer Company at Rillton, Pa.

London reports that the South African output of gold in October is estimated at 520,000 fine ounces, the greatest in history.

The Pittsburgh Foundrymen's Association.

This society has issued a calendar for meetings for the 1906-1907 season. The meetings will be held in Engineers' Hall, Fulton Building, Sixth street and Duquesne Way, Pittsburgh, on the first Monday evening of each month. On December 3 Dr. W. H. Noyes of the Bureau of Standards, Department of Commerce and Labor, Washington, D. C., will read a paper, the subject of which

The Iron and Steel Census for 1905.†

WASHINGTON, October 30, 1906.—A preliminary report on the manufacture of iron and steel and their products in 1904 has been prepared by the Census Bureau in comparison with the statistics of the Twelfth Census, which embraced the returns for 1900. This group ranks second in gross value of products, second in the average number of wage earners and first in the total amount paid annually in wages. Food and kindred products alone exceed it in value of output and average number of wage earners.

The general designation "iron and steel and their products," embraces 37 industries. The basic industries are the manufacture of pig iron and rolled iron and steel. On these are founded all the other industries of this group, such as those producing structural iron work, machinery, tools, hardware, tin and terne plate, cutlery, wire and the more delicate classes of products represented by electrical measuring instruments, &c. Following is a comparative summary of the leading statistics of the group for 1904 and 1900:

	1904.	1900.
Establishments	14,239	13,878
Capital	\$2,331,498,157	\$1,538,459,831
Wage earners.....	857,298	737,986
Wages	\$482,357,503	\$384,233,365
Miscellaneous expenses.....	\$166,896,587	\$91,955,596
Cost of materials.....	\$1,179,981,458	\$993,965,831
Product	\$2,176,739,726	\$1,806,278,241

The Census Bureau has selected for its preliminary report the statistics covering the operations of blast furnaces and of steel works and rolling mills (including forges and bloomerles), and those relating to metal working machinery and tin and terne plate.

Blast Furnaces.

The pig iron product for the census of 1900 amounted to 14,447,791 tons and for the census of 1904 to 16,623,625 tons, an increase of 2,175,834 tons, or 15.1 per cent. During the decade from 1890 to 1900 the quantity increased 5,602,606 tons, or 63.3 per cent. The following table shows the materials used by kind and quantity and cost, and the products by kind, quantity and value of the blast furnaces in 1904, as compared with 1900:

	1904.	1900.
Materials used, total cost.....	\$178,941,918	\$131,503,655
Iron ore: Domestic—		
Tons	29,202,944	24,612,511
Cost	\$96,206,246	\$61,795,473
Foreign—		
Tons	829,918	754,383
Cost	\$4,739,123	\$4,107,449
Fluxing materials:		
Tons	8,325,209	7,324,743
Cost	\$6,888,647	\$5,054,725
Anthracite coal and culm:		
Tons	560,637	886,564
Cost	\$1,812,779	\$2,297,419
Bituminous coal, used raw and slack:		
Tons	801,640	832,235
Cost	\$1,340,997	\$1,101,312
Coke:		
Short tons.....	19,739,671	16,461,533
Cost	\$57,126,997	\$38,976,770
Charcoal:		
Bushels	37,273,569	30,677,585
Cost	\$2,521,887	\$1,823,881
Mill clinder, scrap, scale, &c.:		
Tons	1,865,385	1,600,313
Cost	\$3,830,961	\$3,772,385
All other materials.....	\$4,474,281	\$12,574,241
Products, aggregate value.....	\$231,822,707	\$206,756,557
Pig iron:		
Total tons.....	16,623,625	14,447,791
Total value.....	\$228,911,116	\$206,512,755
Pig iron, spiegeleisen, ferromanganese, &c. (reported above), used in works of company reporting:		
Tons	9,926,545	*
Value	\$138,867,586	*

† While the five year census is officially designated as of 1905, the figures were collected for the calendar year 1904. To avoid serious differences with figures of production already published for 1904 and 1905 by the American Iron and Steel Association, and universally accepted as authentic, the correct year is used in this article instead of 1905, as used by the Census Bureau.—THE EDITOR.

* Not shown separately.

Product of pig iron classified by grades:

Bessemer (from 0.04 to 0.10 per cent. in phosphorus)—		
Tons	8,894,584	8,475,530
Value	\$123,766,565	*
Low phosphorus (below 0.04 per cent. in phosphorus)—		
Tons	192,795	*
Value	\$3,111,470	*
Malleable Bessemer—		
Tons	316,964	*
Value	\$4,322,380	*
Basic—		
Tons	2,553,940	987,439
Value	\$35,089,846	*
Foundry—		
Tons	3,675,310	3,510,300
Value	\$47,001,758	*
Forge—		
Tons	601,677	1,057,616
Value	\$7,348,339	*
White and mottled and miscellaneous—		
Tons	98,627	208,323
Value	\$1,212,111	*
Spiegeleisen—		
Tons	169,630	163,672
Value	\$3,655,449	*
Ferromanganese—		
Tons	58,018	51,878
Value	\$2,428,798	*
Ferrosilicon (7 per cent. and over in silicon)—		
Tons	152,611	35,910
Value	\$842,700	*
Direct castings—		
Tons	9,469	7,123
Value	\$131,700	*
Sand cast, tons.....	6,078,844	*
Chill cast, tons.....	329,460	*
Machine cast, tons.....	4,307,108	*
Delivered in molten condition, tons.	5,898,744	*

* Not shown separately.

† Includes 946 tons of ferrophosphorus.

The number of blast furnaces reported in both census years 1900 and 1904 was 343, which included 18 idle furnaces in 1900 and 26 in 1904. The daily capacity of the furnaces in 1900 was 54,425 tons, but in 1894 it rose to 78,180 tons. In 1900 there were in course of construction 16 furnaces, with a daily capacity of 7275 tons, while in 1904 there were four furnaces, with a daily capacity of 1375 tons.

Steel Works and Rolling Mills.

There has been a considerable increase in the manufacture of boiler and other plates and sheets, wire rods, hoops, bands, cotton ties, and skelp and rolled blooms, slabs, billets and tin plate bars. In 1904 as compared with 1900 the quantity of steel rails manufactured decreased 56,752 tons, or 2.5 per cent., although the value increased \$11,734,071, or 25.2 per cent. In 1900 as compared with 1890 the quantity increased 396,595 tons, or 21.4 per cent., but the value decreased \$13,770,596, or 22.8 per cent.

The following table shows the materials used by kind, quantity and cost and the products by kind, quantity and value of the steel works and rolling mills in 1905 as compared with 1900:

	1904.	1900.
Materials used, total cost.....	\$441,204,432	\$390,895,277
Iron ore:		
Tons	549,995	546,310
Cost	\$2,396,792	\$1,348,809
Spiegeleisen, ferromanganese and all other pig iron:		
Tons	12,191,228	10,411,281
Cost	\$172,101,436	\$151,064,348
Old iron or steel rails and other scrap iron and steel:		
Tons	5,124,277	4,126,980
Cost	\$67,601,248	\$66,852,621
Purchased hammered iron ore blooms and imported Swedish billets and bars:		
Tons	81,969	82,720
Cost	\$1,781,126	\$1,150,575
Purchased muck or scrap bar:		
Tons	205,951	161,329
Cost	\$5,066,732	\$4,535,939
Iron or steel ingots, blooms, billets, tin plate bars, sheet bars and slabs, except imported Swedish billets and bars:		
Tons	4,632,257	3,682,407
Cost	\$103,420,970	\$92,123,412

Purchased wire rods:		
Tons	161,914	136,725
Cost	\$4,774,383	\$5,419,617
Fuel	\$35,192,961	\$22,430,642
All other materials.....	\$48,868,784	\$45,969,314
Products, aggregate value.....	*\$673,965,026	\$597,211,716
Rolled, forged and other classified products:		
Total tons.....	18,216,639	15,055,626
Total value.....	\$584,299,439	\$510,906,040
Rails—		
Iron—		
Tons	900	880
Value	\$20,700	\$31,180
Steel—		
Tons	2,193,705	2,250,457
Value	\$58,236,050	\$46,501,979
Renewed or rerolled rails—		
Iron—		
Tons	5,000	.....
Value	\$150,000	†
Bessemer steel—		
Tons	92,721	.....
Value	\$2,284,115	†
Open hearth steel—		
Tons	1,809	.....
Value	\$46,213	†
Iron and steel bars and rods, not including sheet or tin plate bars or wire rods—		
Tons	2,442,810	2,493,159
Value	\$84,069,122	\$100,597,221
Structural shapes, including light and heavy shapes—		
Iron—		
Tons	4,475	27,091
Value	\$145,200	\$1,051,556
Bessemer steel—		
Tons	331,671	263,800
Value	\$11,089,170	\$8,381,717
Open hearth steel—		
Tons	618,391	566,092
Value	\$21,496,531	\$19,928,249
Iron and steel hoops, bands, cotton ties and skelp—		
Tons	1,894,913	1,195,189
Value	\$59,540,212	\$49,159,747
Iron and steel rolled car axles—		
Tons	631	2,229
Value	\$26,138	\$88,841
Iron and steel hammered car axles—		
Tons	82,954	100,377
Value	\$2,849,691	\$4,394,096
Muck and scrap bar produced for sale—		
Tons	150,926	203,681
Value	\$394,998	\$5,940,587
Iron and steel boiler and other plates and sheets (except nail and tack plates and armor plate)—		
Tons	2,360,494	1,882,080
Value	\$103,099,080	\$89,077,029
Iron and steel nail plate—		
Tons	67,857	81,101
Value	\$1,826,756	\$2,466,340
Iron and steel tack plate—		
Tons	18,744	16,563
Value	\$635,320	\$650,218
Iron and steel armor plate and gun forgings—		
Tons	22,839	15,302
Value	\$9,560,816	\$7,526,479
Iron and steel rolled blooms, slabs, billets, tin plate bars and sheet bars, produced for sale—		
Tons	4,823,585	4,172,286
Value	\$109,611,104	\$96,321,887
Steel ingots, produced for sale—		
Tons	196,404	103,707
Value	\$3,985,310	\$2,781,145
Direct steel castings—		
Tons	287,325	177,156
Value	\$20,600,136	\$14,609,893
All other rolled iron and steel products, including wire rods—		
Tons	2,344,424	1,423,467
Value	\$75,401,810	\$54,732,135
All other forged, cast or other iron and steel products, not including cut nails, wire nails, bolts, nuts, rivets, &c.—		
Tons	274,061	81,009
Value	\$15,684,967	\$6,665,741
All other products not classified, including amount received for custom work.....		
	\$89,665,587	\$86,305,676

* In addition, steel castings and rolled steel to the value of \$247,264 were produced by establishments engaged primarily in the manufacture of other products.

† Included under custom work and repairing.

Steel ingots manufactured either for consumption or sale—		
Total tons.....	13,379,083	10,507,844
Total value.....	\$240,284,576	\$197,928,982
Bessemer, including ingots, made in Clapp-Griffith, Robert-Bessemer, Bookwalter or other converters—		
Tons	7,754,488	7,528,267
Value	\$132,951,636	\$131,791,519
Acid open hearth—		
Tons	573,475	761,516
Value	\$12,967,630	\$17,969,322
Basic open hearth—		
Tons	4,974,921	2,117,311
Value	\$88,794,839	\$40,881,259
Crucible—		
Tons	76,199	100,750
Value	\$5,570,471	\$7,286,882
Miscellaneous products not rolled (value previously included).....		
Cut nails and cut spikes—	\$137,971,340	.....
Iron, or combined iron and steel—		
Kegs (100 lb.).....		
Value	\$350,879	738,100
Value	\$662,044	\$1,364,255
Steel—		
Kegs (100 lb.).....		
Value	\$960,670	920,343
Value	\$1,732,064	\$1,927,808
Iron and steel wire nails—		
Kegs (100 lb.).....		
Value	\$9,061,512	4,603,010
Value	\$17,495,362	\$12,445,096
Iron and steel wire—		
Net tons.....	624,298	579,595
Value	\$30,992,672	\$35,283,688
All other wire products—		
Net tons.....	339,121	**
Value	\$19,063,409	.....
Iron and steel bolts, nuts, rivets, forged spikes, washers, &c.—		
Pounds	621,165,317	.....
Value	\$13,854,635	**
Iron and steel wrought pipe or tubes—		
Tons	849,047	.....
Value	\$43,985,728	**
Iron and steel seamless drawn, clinched, brazed, &c., pipe—		
Pounds	46,224,320	.....
Value	\$2,290,234	**
Iron or steel springs, car, carriage, furniture and all other—		
Tons	22,022	.....
Value	\$1,708,632	**
Horse and mule shoes—		
Tons	68,594	.....
Value	\$5,483,137	**
Stamped ware.....		
Value	\$292,923	**
Shovels, spades, scoops, &c.....		
Value	\$410,500	**

** Not shown separately.

The total daily capacity, double turn, of the rolling mills reported in 1904 was 105,501 tons of iron and steel, as compared with 87,063 tons in 1900. Eighty-one converters were in use in 1904, as compared with 70 in 1900, and the total daily capacity of ingots or direct castings, double turn, in 1904 was 41,448 tons, as compared with 34,925 tons in 1900. In open hearth steel plants there were 142 acid furnaces with a daily capacity of 7341 tons and 339 basic furnaces with a daily capacity of 26,902 tons in 1904, as compared with 139 acid furnaces having a capacity of 6094 tons and 168 basic furnaces with a capacity of 12,151 tons in 1900. The total daily capacity, double turn, of the crucible blister, German and miscellaneous steel plants in 1904 was 791 tons, as compared with 575 tons in 1900.

Metal Working Machinery.

The total value of the metal working machinery produced in 1904 was \$32,408,766, as compared with \$24,737,904 in 1900, a gain of 33 per cent. The following table shows the production of the most important classes of metal working machinery by kind, quantity and value in 1905, as compared with 1900:

	1904.	1900.
Products, aggregate value.....		
	\$32,408,766	\$24,737,904
Hammers, steam, power and drop:		
Number	1,934	857
Value	\$832,698	\$671,287
Forging machines, including bolt headers, &c.:		
Number	390	821
Value	\$437,097	\$424,774
Stamping, flanging and forming machines:		
Number	8,235	7,895
Value	\$2,003,861	\$1,180,960

Punching and shearing machines:		
Number	4,328	5,269
Value	\$1,425,510	\$1,219,605
Bending and straightening rolls:		
Number	174	914
Value	\$190,578	\$202,230
Riveting machines:		
Number	645	202
Value	\$238,829	\$139,295
Lathes:		
Hand—		
Number	3,912	3,945
Value	\$190,576	\$306,081
Engine—		
Number	7,676	12,089
Value	\$3,523,470	\$4,451,867
Turret, including all automatic or semiautomatic lathes for making duplicate pieces—		
Number	2,898	3,687
Value	\$2,210,814	\$2,449,121
Boring and turning mills or vertical lathes:		
Number	611	534
Value	\$913,695	\$1,123,314
Boring and drilling machinery, including all machines using drills or boring bars:		
Number	23,579	22,890
Value	\$2,369,712	\$2,779,983
Planers, including plate-edge planers—		
Number	1,100	1,543
Value	\$1,551,616	\$1,808,955
Slotters and shapers:		
Number	2,012	3,076
Value	\$845,860	\$1,136,350
Milling machines, including all machines using a milling cutter:		
Number	4,032	4,119
Value	\$2,476,626	\$2,171,966
Sawing machines:		
Number	2,806	2,846
Value	\$165,428	\$222,563
Grinding and polishing machinery, including all machines using abrasive cutters:		
Number	19,193	10,014
Value	\$1,310,903	\$880,965
Bolt, nut and pipe threading and tapping machines:		
Number	2,687	2,088
Value	\$899,107	\$698,362
Pneumatic hand tools:		
Number	19,297	6,751
Value	\$1,732,107	\$143,325
All other metal working machines.	\$9,090,189	\$2,726,901

Tin and Terne Plate.

The output of tin and terne plate in 1904 was valued at \$35,283,360, as compared with \$31,892,011 in 1900, an increase of 10 per cent. The cost of materials, however, rose from \$26,728,150 to \$31,375,714, or 17 per cent. The following table shows the materials used by kind, quantity and cost, and the products by kind, quantity and value in 1904 as compared with 1900:

	1904.	1900.
Materials used, total cost.....	\$31,375,714	\$26,728,150
Black plates or sheets for tinning:		
Domestic—		
Pounds	1,019,524,757	825,556,992
Cost	\$22,988,237	\$20,590,566
Foreign—		
Pounds	83,900	2,358,607
Cost	\$3,769	\$78,282
Pig tin:		
Pounds	24,243,851	20,282,778
Cost	\$6,709,164	\$4,528,473
Pig lead:		
Pounds	8,201,253	6,871,480
Cost	\$366,558	\$398,617
Palm oil:		
Pounds	6,628,526	5,511,645
Cost	\$376,310	\$282,227
Sulphuric acid, tinning flux, bran and plnk meal.....	\$180,011	\$187,318
All other materials.....	\$751,665	\$662,667
Products, total value.....	\$35,283,360	\$31,892,011
Tin plates:		
Pounds	867,526,985	707,718,239
Value	\$28,429,971	\$25,553,021
Terne plates:		
Pounds	158,857,866	141,285,783
Value	\$6,119,572	\$5,731,124
Other sheet iron or sheet steel, tinned or terne plated:		
Pounds	6,555,855	1,000,473
Value	\$217,476	\$86,492
All other products, including custom work.....	\$516,341	\$521,374

The daily capacity of the tin and terne plate plants, single turn, in 1904 was 2,966,365 lb. of tin plates and 567,180 lb. of terne plates, as compared with 2,003,538 lb. of tin plates and 729,363 lb. of terne plates in 1900.

W. L. C.

The Use of Reinforced Concrete.

As experience with reinforced concrete increases, more of a disposition appears to check overenthusiastic claims and to protest against the tendency to get away from large factors of safety. The *Engineering News* comments as follows:

Just how far is it safe to go in the use of reinforced concrete in fixing dimensions proportionate to stresses, as one would do in a steel structure? We hardly need to say that engineers differ radically among themselves as to the proper answer for this question. There are plenty of engineers who hold that the present use of reinforced concrete is a passing fad, which is just now running into intemperate excesses. There are plenty of other engineers, however, who are entirely ready to take chances, and every week sees some new and more daring achievement in reinforced concrete construction. . . . We have no doubt whatever as to the merits of concrete and steel in combination. Even where concrete is to act solely in compression, the use of a certain amount of steel to resist temperature stresses and unforeseen variations in loading is doubtless to be the standard practice of the future. But let us not repeat the mistake which was made by the early iron bridge engineers, of paring down sections to fit too closely the theoretical computation of stresses. Concrete is cheap. A little increase in the thickness of walls may largely increase the strength of a structure and yet cause only a moderate increase in cost, for the large items of expense for labor and for forms will be very little affected.

The New Gary Steel Plant.

Of the \$11,000,000 appropriated during the quarter ending September 30, 1906, by the United States Steel Corporation for "additional property, construction and discharge of capital obligations," \$3,500,000 was on account of the new plant at Gary. Substantial progress is being made in the building of the town of Gary, and it is hoped that the new plant will be making steel by the spring of 1908. It is not expected, however, that the works will be completed before the expiration of five years. Foundations have been laid for several blast furnaces, open hearth furnaces, machine shops, office buildings, pump stations and warehouses. A good deal has also been done toward excavating the channel entrance and the laying of sewers and grading of streets. Also various dwelling houses and business building are being erected, the latter by outsiders who have purchased land. While it is contemplated to expend ultimately \$75,000,000 or more at Gary, there has been thus far expended \$3,475,563 on land and improvements, and the corporation has set aside \$18,524,436 more. The latter sum is in cash or invested in salable securities. The question of a bond issue for the completion of the plant has not even been considered, nor is it likely to be in the near future.

In 1905 there were in Luxemburg 75 iron mines, which produced 6,595,860 metric tons of ore, valued at 2.50 francs per ton, and operated with 4189 miners and 2089 surface hands. Of this total product the 32 furnaces in the Grand Duchy consumed 4,349,201 tons and made 1,368,251 tons of pig iron, there having been imported for the furnaces 47,533 tons of manganiferous ores. Of the total pig iron product 1,098,154 tons was basic Bessemer pig, 100,766 tons was mill iron and 169,331 tons was foundry iron. The total value was 82,338,600 francs and 3728 men were employed. The four steel works made for sale 40,490 tons of ingots, 142,841 tons of billets, blooms and bars, and 214,611 tons of finished products, a total of 397,942 tons.

Panama Canal Plans.

The Isthmian Canal Commission has issued a statement describing the general plan for the construction of the Panama Canal. It is explained that the type of canal proposed by the minority of the Consulting Board is to form a summit level about 85 ft. above the level of the sea, which is to be reached by a flight of locks built at Gatun, on the Atlantic side, by one lock at Pedro Miguel and two others at La Boca, on the Pacific side. The locks are all to be in duplicate.

The summit level will be formed by the construction of a large dam at Gatun and a small one at Pedro Miguel. A second lake, with a surface elevation of 55 ft., will be formed on the Pacific side between Pedro Miguel and Panama Bay by the construction of a dam at La Boca, across the mouth of the Rio Grande, and another dam between Soca Hill and high ground near Corozal.

From the Caribbean Sea to the mouth of the Mindi River a channel is to be excavated, having a bottom width of 500 ft. and a depth of 45 ft. below mean tide. From the mouth of the Mindi to the Gatun locks the width and depth are to be the same as from the sea to the mouth of the river.

The Gatun locks are to be built in duplicate. The lift will be overcome by a flight of three locks of 28 1-3 ft. or by two locks of 42 1/2 ft. each. The Gatun dam will reach from a point near the Gatun Hills, on which the locks are to be located, to the hill 3500 ft. westward, in which the spillway will be built. The object of this dam is to form a reservoir in which the floods of the Chagres will be received. Its area will be approximately 110 square miles. Works for regulating the level of the lake will be situated in the hills that lie midway between two extremes of the dam. They will consist of a system of gates constructed on foundations of concrete. The gates will be almost counterparts of those used on the Chicago Drainage Canal.

From the Gatun locks to San Pablo, a distance of about 15 miles, only a small amount of excavation will be required. The width of the canal will be about 1000 ft. and the depth 45 ft. The growth for 50 ft. along the shores is to be removed. Further up the lake, as the amount of excavation necessary to obtain a depth of 45 ft. increases, the width of the channel will be decreased, first to 800 ft., then to 500, then to 300 from Obispo to Las Cascades, a distance of about 1 1/2 miles, where the Culebra cut begins.

The channel from Matachin to Bas Obispo may be narrowed to 100 ft. From Las Cascades to Paraiso, a distance of 4.7 miles, the width of the channel will be 200 ft. This is the most difficult work of the whole canal construction. From Paraiso, the end of Culebra cut, to the Pedro Miguel lock, a distance less than 2 miles, the channel will be 300 ft. wide. The Pedro Miguel lock will have a lift of 30 ft. and will be in duplicate, with approach walls at each end. From the lock for a distance of 1.87 miles the channel will be 500 feet wide, and will then be increased to 1000 feet for a distance of 3.61 miles to Sosa Hill, on the shore of Panama Bay, where the Sosa locks will be built. These locks will be in two flights, with lifts of 27 1/2 ft. each, and will be in duplicate.

A dam will be constructed across the Rio Grande from San Juan Hill to Sosa Hill, another from Sosa Hill to Corozal Hill and a small dam from Corozal Hill to the high ground eastward. These dams will form a lake known as Soso Lake. It will have an area of 8 square miles and will be provided with regulation works for discharging the surplus water.

From the Sosa locks to deep water in Panama Bay, a distance of 4 miles, the channel is to have a bottom width of 500 ft. and a depth of 50 ft. below mean tide. The mean rise and fall of the tide is about 15 ft.

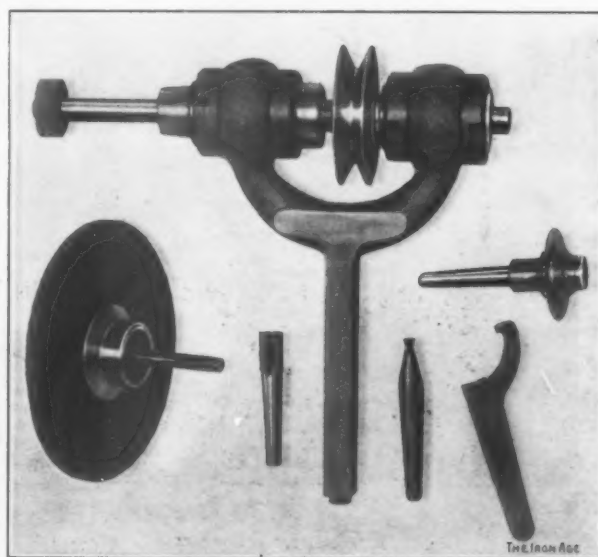
The Panama Railroad will be relocated throughout almost the entire distance from the mouth of the Mindi River to Panama, and some heavy embankments will be required to cross certain parts of Gatun Lake.

The New York Chamber of Commerce, at a largely attended meeting on November 1, adopted the report of its

special committee on currency reform submitted a month ago and approved the recommendations. These provide for the establishment of a central bank of issue or an emergency circulation equal to 35 per cent. of a national bank's capital, such circulation to be subject to a graduated tax to constitute a guaranty fund for the redemption of notes of failed banks. They also favor the repeal of the law restricting the retirement of national bank notes and a law requiring the deposit in national banks of all Government moneys above a reasonable working balance.

A New Pratt & Whitney Tool Post Grinder.

A new style grinder adapted to be used in the No. 3 bench lathe built by the Pratt & Whitney Company, Hartford, Conn., has been brought out by that company and is herewith illustrated. The frame of the device is a steel casting and is secured in the slide rest tool post in the same way as in an ordinary turning tool. The spindle is of tool steel, hardened and ground, with straight bear-



A New Style Tool Post Grinder for the No. 3 Bench Lathe Made by the Pratt & Whitney Company, Hartford, Conn.

ings running in bronze boxes. The boxes are split, tapered on the outside and mounted in steel bushes, with a nut on each end, by which adjustment can be made to compensate for wear. The bearings are protected against the entrance of dust at every vulnerable point by dust caps and felt packing rings.

The spindle has a taper hole to receive small grinding disks on tapered stems for internal grinding, and on the externally tapered nose of the spindle a wheel mount is attached to receive larger wheels for external grinding. The spindle is driven by a grooved pulley, taking a round belt about 1/8 in. in diameter. Oil for the bearings is introduced at one end of the shank of the frame, which is hollow and serves as a reservoir.

When furnished with small cutters on taper stems this tool may also be used for light milling and drilling.

Secretary of the Navy Bonaparte November 1 opened the plans submitted to the Department in accordance with the terms of the circular sent out in July last inviting naval constructors to submit designs for the battleship contemplated by the action of the first session of the Fifty-ninth Congress. Four designs were received from outsiders, and two designs were submitted by the Board of Construction of the Navy Department. Secretary Bonaparte reserved action in regard to them.

The Pennsylvania Railroad Company pays to the State of New Jersey the highest taxes of any railroad company operating lines in that State. The amount just fixed by the State Board of Assessors is \$1,077,513.13. The total taxes received from railroads is \$3,500,371.56.

Electrification of the West Jersey & Seashore Railroad.

The longest main line double track steam road in the country which has thus far been electrified is the West Jersey & Seashore Division of the Pennsylvania Railroad. The line extends from Camden, N. J., via Newfield, to Atlantic City, a distance of 65 miles, and from Newfield to Millville, a distance of 10 miles. The power house is of an original design and was built in record time, the site being selected January 17, 1906, and current for the first train supplied on July 1. On September 18 the line was placed in operation.

In addition to the power house there are eight substations, one of which is in the power house. Approximately 150 miles of single track have been electrically equipped; 71 miles of duplicate high-tension transmission line erected, and 68 cars constructed and equipped.

Atlantic City on one hour intervals, the running time being 90 minutes, and a local service of two, three and four car trains on a minimum interval of 15 minutes during the rush hours between Camden and Glassboro, every fourth train going to Millville. Motor baggage and mail cars are attached to the passenger trains as conditions require. Provision is made in the power house and substations for increasing the equipment to accommodate the heavier traffic which is expected to result from the improved service. Each car in the electric service is a motor car, no trailers being used.

The contract for the entire electrification work was given to the General Electric Company and certain portions were sublet. The electrical equipment throughout is of standard General Electric design. The general scheme of electrification consists of generating alternating current at 6600 volts, stepping it up to 33,000 volts, at which pressure it is transmitted to the substations, where it is reduced to 430 volts by step-down transform-

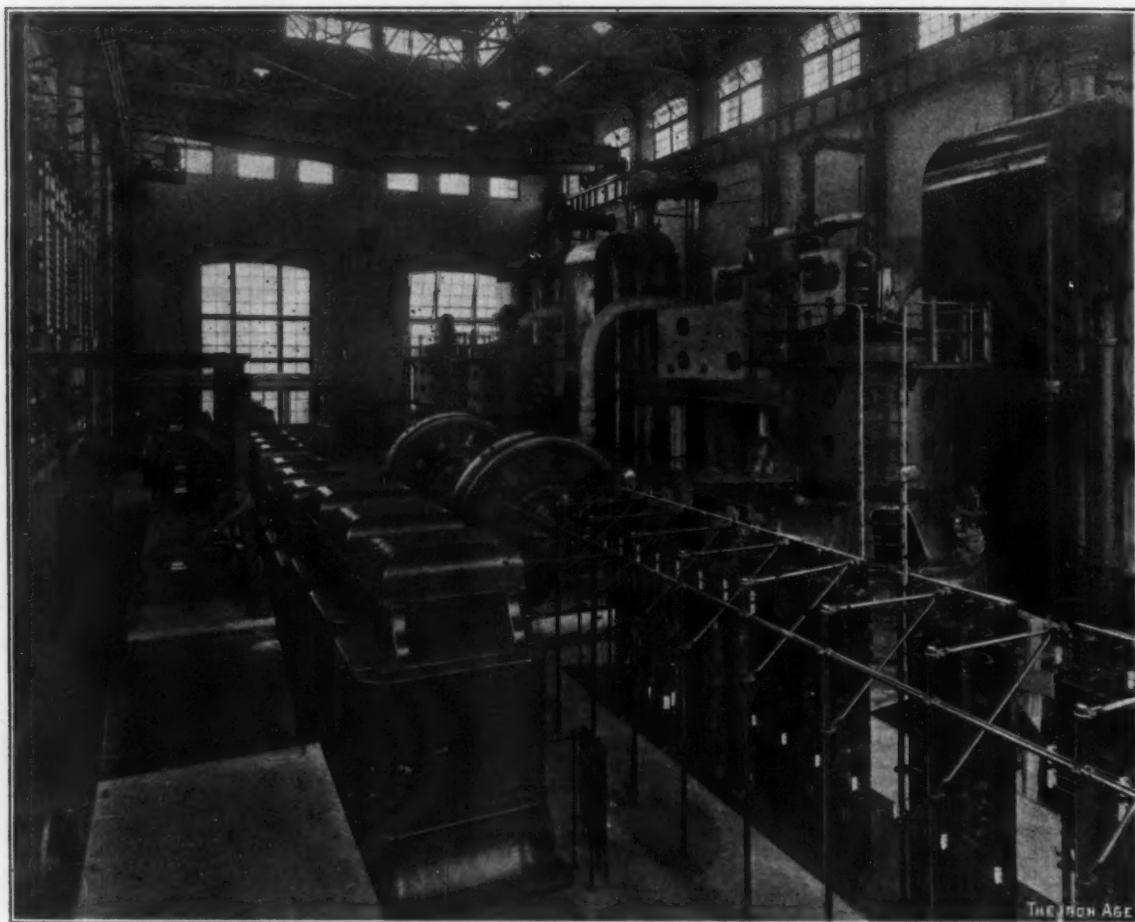


Fig. 1.—Interior View in the Westville Power Station.

On the line from Newfield to Millville an overhead trolley has been installed, but the main line except at a few points uses the third rail. The line from Camden to Atlantic City is double track and is three track between Camden and Woodbury. The line from Newfield to Millville is single track. The Pennsylvania Railroad Company has two roads connecting Camden with Atlantic City, and it is the longer of these that has been electrified, because there is a large local traffic on it that can be handled more economically and expeditiously by electric traction than by steam.

The power house and substation equipment and the line are laid out with a view of supplying sufficient power for the operation of all the cars now provided, operating an express service of three-car trains running 15 minutes apart in each direction at a speed on straight level track of 60 miles per hour, and a local service of two-car trains between Camden and Millville on half-hour intervals, and single cars between Camden and Woodbury on 10-minute interval. The initial schedule includes three-car express trains between Camden and

ers, and then led to the rotaries and converted to direct current at 650 volts, at which pressure it is fed to the third rail for operating the cars.

The power house is situated at Big Timber Creek, just to the north of Westville, N. J., 5.6 miles from the Camden terminal, where there is an abundance of water for boiler feed and condensing purposes. An interior view in the power house is given in Fig. 1, and Fig 2 is a cross sectional elevation. The electrical equipment includes three 2000-kw. 6600-volt 25-cycle 3-phase Curtis turbo generators, two 75-kw. 125-volt Curtis turbo-exciter, nine 700-kw. 25-cycle air blast transformers, and three blowers, capacity of each 20,000 cu. ft. per min. Sufficient room is provided for an additional 2000-kw. turbo generator set, together with the necessary auxiliaries. One of the end walls of the station is of a temporary nature in order that increasing demands for power may be met with a minimum expenditure in the future.

The most important items among the auxiliaries are the two exciter sets already mentioned; three barometric condensers built by Williamson Brothers, in connection

with Cramp & Co., Philadelphia, who were also the sub-contractors for the circulating and air pumps; three dry air pumps built by I. P. Morris & Co.; three centrifugal circulating pumps built by the same company and driven by Reeves engines; two Cochrane feed water heaters; the following Worthington pumps—two boiler feed, two makeup, two step-bearing and three step-bearing water return pumps, and one accumulator for the step bearings, supplied by R. D. Wood & Co., Philadelphia. W. K. Mitchell & Co., Philadelphia, were the subcontractors

to cars on the tracks on the boiler room floor. The ashes are taken from the boiler house in cars and dumped into the receiving hopper, from where they are raised by the skip, but the deflector is thrown in the reverse direction from that shown in the illustration. The ashes are conveyed by the ash chute to the ash storage bin, whence they are conveyed by a chute to cars on the railroad track.

The eight substations are located as follows: One in the power house at Westville; three terminal substations

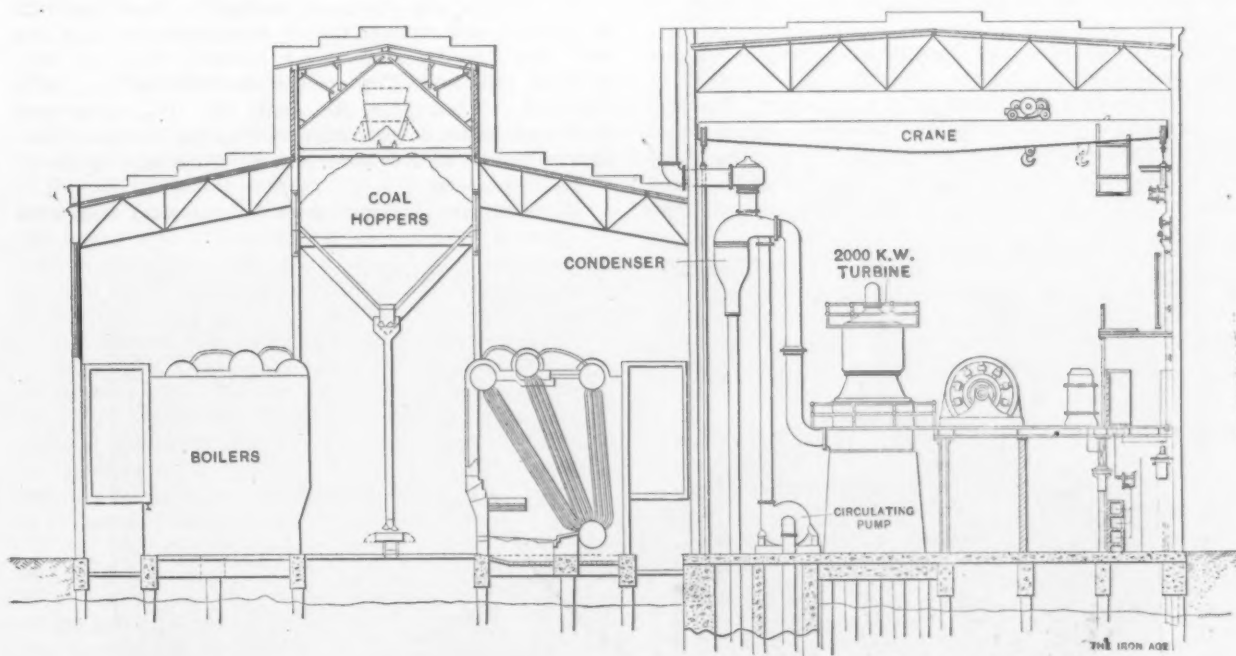


Fig. 2.—Transverse Section of Westville Power Station.

for the steam piping in the power house with the steam valves, &c., and Keasbey & Mattison furnished the pipe covering.

The boiler house contains 12 358-hp. Stirling water-tube boilers arranged in pairs forming six batteries. The coal and ash handling arrangement is illustrated in Fig. 3. The coal is dumped from the railway cars into a re-

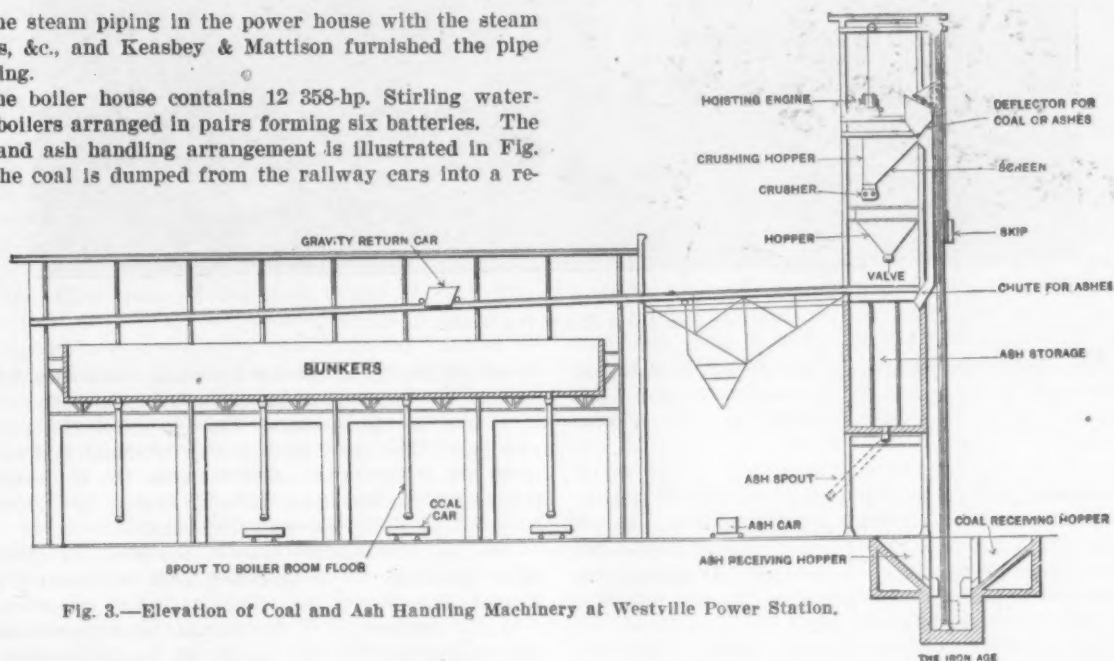


Fig. 3.—Elevation of Coal and Ash Handling Machinery at Westville Power Station.

ceiving hopper over which the rails are laid. The receiving hopper has a slanting bottom to feed the coal by gravity through a valve which is only opened when the skip is in position for loading. The loaded skip is raised by the hoisting engine till it reaches the level of the deflector, when it is automatically tipped into the crushing hopper, the smaller coal passing through the screen, and the larger coal being broken in the crusher in transit. From this hopper the coal is fed into the gravity return car by the valve at the bottom, when it is conveyed by the automatic railroad over the coal bunkers, into which it is tipped. From these bunkers the coal is again fed

at South Camden, Clayville and Atlantic City, and four intermediate substations, at Glassboro, Newfield, Mizpah and Reega. The Clayville and Mizpah substations each has two 500-kw. converters, all the others two 750-kw. converters each.

Inspection sheds have been built at each of the three terminals, the largest, at Camden, accommodating nine cars, with room for office, storeroom and small machine shop.

The 33,000-volt high tension transmission line is in duplicate throughout. The poles are of chestnut, generally 45 ft. high, with extra long poles where special con-

ditions require. They are spaced 125 ft. apart, but at street crossings the spacings are reduced to 100 ft. Protection from lightning consists of a seven-strand galvanized steel cable 5-16 in. in diameter, strung the length of the line on top of the transmission poles, 4 ft. above the nearest active wire, and provided with ground connection at every fifth pole. This form of protection from lightning is believed to be an efficient supplementary adjunct to the arresters. In all there are 71 miles of transmission line. The third rail is of the Pennsylvania Railroad standard cross section, 100 lb. per yard, and was used in order that it might be interchangeable with the track rails.

The insulators are of reconstructed granite and are held in position by a metal centering cup, which is secured to the long ties by means of a lag screw. The general form of these insulators may be seen in Fig. 4, which also shows the method of retaining them in position. The top of the third rail is $3\frac{1}{2}$ in. above the top of the track rails and 26 in. distant from the adjacent track rail, these

For initial service 62 passenger cars and six combination baggage and mail cars have been provided. All are motor cars, the motor and control equipment being the same on all. The general design of the standard Pennsylvania Railroad coaches was followed except that the height is less than standard to decrease the weight, the shape of the roof is changed and the interior finish is of mahogany instead of oak. These cars also differ in some other details, such as coloring of the seats, the basket racks, sash fixtures and lighting fixtures. Fig. 4 shows the type of passenger cars. The seating capacity is 58.

The Wason Mfg. Company, Springfield, Mass., built 22 of the passenger cars and the six combination baggage and mail cars; the American Car & Foundry Company, Wilmington, Del., built 22 passenger cars, and the J. G. Brill Company, Philadelphia, Pa., built 18. The motor and trailer trucks for 65 cars were built by the Baldwin Locomotive Works, Philadelphia, and for three cars by the J. G. Brill Company.

The cars are equipped with hand brakes and with

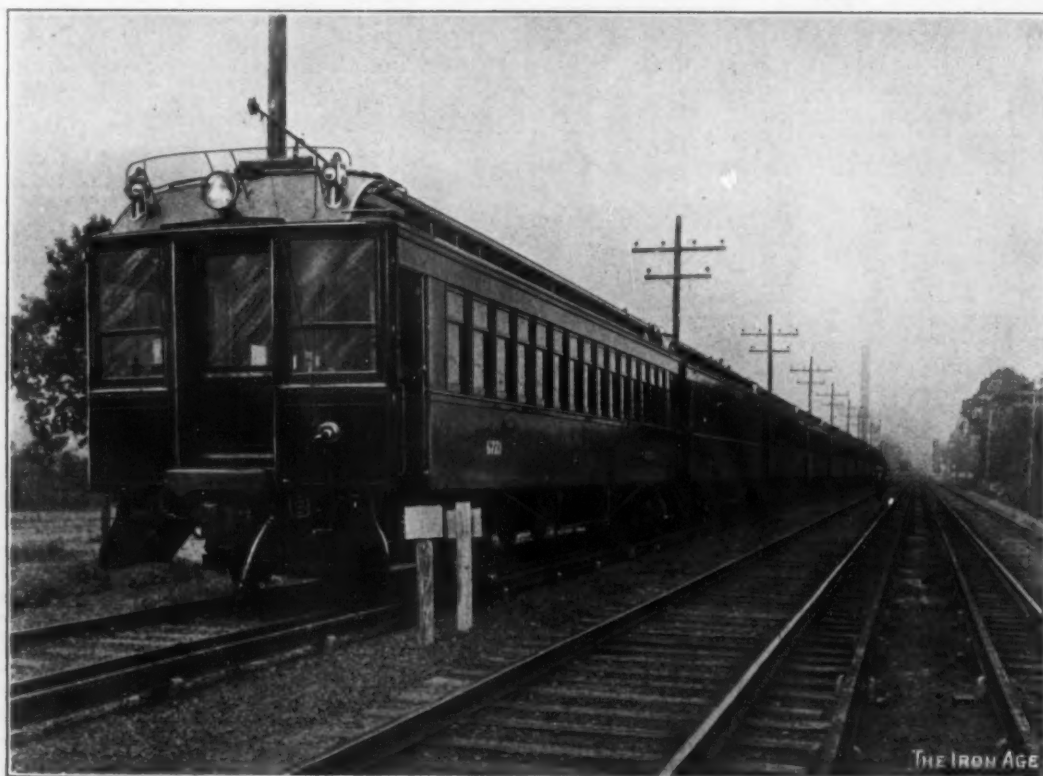


Fig. 4.—A Motor Car Train.

dimensions constituting the standard of the Pennsylvania Railroad and the Long Island Railroad, and also interchangeable with the Interborough Rapid Transit of New York City.

The company's right of way is fenced in, and at all crossings the fence turns in from the property line to meet cattle guards at the edge of the crossing. At all stations and in the Atlantic City and Camden yards the third rail is protected by a wooden top and side guard. This consists of a 2-in. plank carried on castings attached to the top of the maple posts, which are secured to the third rail at intervals of about 6 ft. Opposite all platforms the rail is further protected by a plank fastened to the side of the rail. Wherever possible the rail is kept between the tracks and is therefore on the side of the track farthest from the station platform, and inter-track fences are provided to prevent crossing the tracks. To prevent passengers or others on the platforms from touching the contact shoes on the platform side of the car there is a protecting plank similar to the third rail protecting plank carried on castings fastened to the ties. The shoes are at all times under this plank and therefore protected. This is used at all stations, even where the third rail gives way to the trolley, although there is a switch on the car switchboard which enables the contact shoes to be cut out when operating from the trolley.

Westinghouse quick service automatic airbrakes. There are two 200-hp. G. E.-69 motors on each car. The control is of the Sprague-General Electric automatic multiple unit type. The controllers are so arranged that current is cut off from the motors throughout the train and the brakes are applied automatically should the motorman release his hold of the controller handle.

The conversion of the lines of the West Jersey & Seashore Railroad above described from steam to electric traction was carried out by the following organizations:

The construction of the terminals, inspection sheds, double tracking, changes in existing tracks, grading, new bridges, changes in telegraph lines and installation of a special telephone system was carried out by the regular Engineering and Maintenance of Way departments of the Pennsylvania Railroad Company. The installation of the interlocking plants and automatic block signalling was carried out by the Union Switch & Signal Company in accordance with the plans of the Signal Department of the Pennsylvania Railroad Company. The new cars and trucks required for the electric service were designed by the Motive Power Department of the Pennsylvania Railroad Company. The entire contract for the electrical equipment, including the construction of the power house, substations and the electrical equipment on the cars, was awarded to the General Electric Company and

In accordance with the plans and under the supervision of George Gibbs, Chief Engineer of Electric Traction, in consultation with the officers of the railroad company. Stern & Sullivan of Philadelphia were appointed by the General Electric Company as their general subcontractors, and the Scofield Company, also of Philadelphia, acted as general engineer for the power house and subcontractors for the piling and foundations. The whole of the electrical work was under the personal supervision of W. B. Potter, engineer, Railway Engineering Department, General Electric Company, directly assisted by J. Elliot Hewes, C. E. Eveleth and W. H. Clapp.

Alundum and Its Manufacture.

One of the remarkable advances in mechanical lines has come through the development of grinding. The field of the old grindstone was limited and the sharpening of edge tools was almost its only use. The introduction of the emery wheel, however, made grinding a very important operation. The emery wheel has not only rapidly replaced the grindstone, but in many operations the work of the cold chisel, the lathe tool, the file and other steel cutting tools is now done more efficiently by grinding.

Before the invention of the electric furnace artificial abrasives suitable for grinding wheels were unknown. As emery occurs in considerable quantities in various parts of the world it came to be recognized and used as the chief raw material, and hence the modern grinding wheel, whether made of corundum or any other abrasive, is popularly known as the "emery wheel."

The Norton Company, Worcester, Mass., has been operating an electric furnace plant at Niagara Falls, N. Y., for the past few years and has developed alundum as the latest of the important electrochemical inventions. The introduction of alundum in the field of grinding has been rapid, due to its extreme hardness and sharpness, combined with uniformity and proper temper. The process of manufacture consists in taking bauxite, the purest amorphous oxide of aluminum found in nature, and purifying and melting it in the electric furnace in a homogeneous bath. Upon cooling, this molten material crystallizes in solid masses of alundum of great purity and uniformity.

The bauxite, of which the Norton Company owns its own mines, is heated in large preliminary heating furnaces to drive off the combined water, and is then melted directly in electric furnaces of special design. Bauxite was considered infusible until the invention of this process, the electric arc only being equal to this task. Eleven electric furnaces have been installed, each capable of producing three tons of alundum every 24 hr. The temperature at which the furnace charge melts in a homogeneous mass is estimated at 6000 to 7000 degrees F. The ingots of alundum are broken up into small pieces by powerful crushers. The material is then passed through rolls to reduce it to the various sizes of grain, which are finally separated by passing over sieves of different mesh to prepare it for manufacture into Norton grinding wheels, rubbing and sharpening stones and other articles.

The solid massive alundum, while resembling the purest natural corundum in chemical composition, is considerably harder than the natural product. This is considered to be due to the perfectly fluid condition in which the mass is melted, the control of its composition, the rate and method of its cooling and crystallization by which it receives its temper, the absence of water of combination, and the pure and even state in which the fluid mass crystallizes.

Chief of the requisites for grinding wheel material are sharpness, hardness, right temper and uniformity. To have sharpness, in order to give rapid and continued cutting, an abrasive must have a fracture with a number of sharp cutting points. This is a conspicuous property of alundum. In the matter of hardness the recognized standard is the diamond, which is No. 10 in the scale of hardness. Pure crystalline corundum, represented by the best sapphire or ruby, has always been the standard of No. 9 in the scale of hardness. This is readily scratched by alundum, and alundum pow-

der is used for cutting and drilling rubies and sapphires for watch jewels, &c. After numerous careful tests alundum is found to exceed $9\frac{1}{2}$ in the scale of hardness, where the diamond is 10. Temper refers to the strength of grain and the character of fracture under grinding pressure. An alundum grain is remarkably tough and will stand high crushing pressure before breaking, but when it does break down it is with a sharp, crisp fracture, giving a fresh, keen, cutting edge, an important quality in an abrasive.

Purity, besides resulting in greater hardness and better temper, is necessary in the bonding of the grain into wheels in order to secure accurate results. Uniformity is a prime requisite. In grinding wheels the abrasive grain of given size is bonded together to produce a certain grade or temper for a certain kind of work. This means that the bond which holds the grains together must be harder or softer, according to the particular work required of the wheel. Cast iron, steel, brass, glass, bone, leather, wood, each demands its own wheel, which must be duplicated to make the grinding operation continuously efficient.

Alundum and the process of making it were awarded the Grand Prize at the St. Louis Exposition. The process is protected by United States and foreign patents which are owned by the Norton Company.

The Growth of the Correspondence School Idea.

Some remarkable figures have been given out concerning the extent of the work of the International Correspondence Schools, Scranton, Pa. The fifteenth anniversary of the founding of these schools was celebrated on October 16 and the history of the movement was reviewed in an address by the president, Thomas J. Foster. The total enrollment in the schools has reached about 930,000. Up to the latter part of last year 90,000 pupils had either received diplomas or completed advance study in the courses for which they were enrolled. In addition 250,000 pupils had completed elementary work in mathematics, drawing or other preliminary studies. In 1905 the total number of recitations or other student work sent into the schools and corrected by instructors was 732,069; the number of special instruction letters written was 109,680. The operating force in all departments is 2800 and the buildings at Scranton represent an investment of over \$500,000. A summary of the financial operations of the schools was given by President Foster and is as follows: "The first year, the receipts of the schools were \$14,991; the second year, \$35,939; the third year, \$73,844. Last year they were \$4,200,000. Last month they were \$425,000, which is more than in any previous month. We receive \$40,000 per year from New Zealand; \$30,000 per year from South Africa; the Canadian Agencies send us \$180,000 per year. The whole amount received in the 15 years that the business has been conducted is \$28,775,000. There has been paid \$2,300,000 in dividends to the stockholders."

Hydrofluoric acid as a cleaning agent for castings has been in general use but a short time, being treated a few years ago as a secret process by those who understood its value and made use of it in removing the clinging sand. Formulas for the acid containing superfluous and innocuous ingredients to mystify the purchaser have been sold for considerable sums. Anything used in connection with this "pickle," aside from the hydrofluoric acid and water, is wholly unnecessary, the usual formula being 1 part of acid to 10 of water. In adding water, however, care should be taken to know the strength of the raw acid, as this is by no means uniform. The idea is to get a dip that will remove the sand perfectly and quickly, the operation requiring 10 to 15 minutes, depending upon both the amount of sand to be removed and the condition of the pickle.

The American Institute of Social Service is finding much interest taken in its exposition of safety devices to be held in New York from January 28 to February 9, 1907.

The W. H. Bristol Recording Pyrometer.

The recording pyrometer illustrated is a development of the indicating thermo-electric pyrometer invented and manufactured by William H. Bristol, 45 Vesey street, New York City, described in *The Iron Age* May 17, 1906. It is applicable to a large number of industrial purposes where it is desirable to automatically and accurately record high temperatures for the sake of economy in production, or the securing of a uniform product.

The complete apparatus consists of the following parts: The recorder, which is located where most con-

venient for observing the records and changing the charts; the thermo-electric couple, the fire end of which is inserted into the medium whose temperature is to be measured, and the duplex flexible cable leads for electrically connecting the recorder and fire ends.

The small current of electricity produced by the thermo-electric couple under the influence of heat being transmitted to the recorder actuates a galvanometer which is contained in a dust proof metal case in the upper part of the recorder box, as shown in Fig. 1. The galvanometer movement is made according to a special design by the Weston Electrical Instrument Company, and has jeweled pivot bearings for the moving coil. It is dead

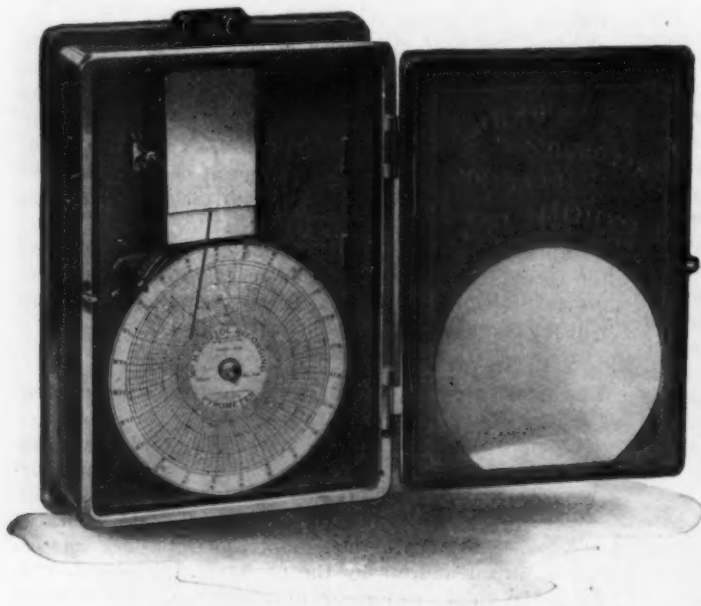


Fig. 1.—The Recorder Case Opened, Showing a Chart in Place.



Fig. 3.—Reproduction of a Typical Chart and Record.

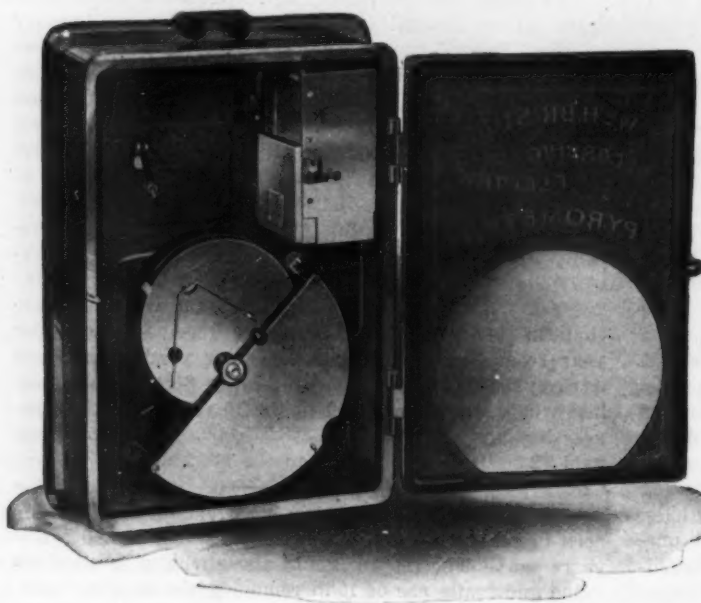


Fig. 2.—The Instrument Ready to Receive a New Chart.

venient for observing the records and changing the charts; the thermo-electric couple, the fire end of which is inserted into the medium whose temperature is to be measured, and the duplex flexible cable leads for electrically connecting the recorder and fire ends.

The small current of electricity produced by the thermo-electric couple under the influence of heat being transmitted to the recorder actuates a galvanometer which is contained in a dust proof metal case in the upper part of the recorder box, as shown in Fig. 1. The galvanometer movement is made according to a special design by the Weston Electrical Instrument Company, and has jeweled pivot bearings for the moving coil. It is dead

beat in its action. The delicate recorder arm is perfectly free to move, since it clears the chart in front of which it is hung. The chart is revolved by a clock movement once in 24 hours, or at any other desired rate. The charts are prepared with a semitransparent smoked surface which is so sensitive that a mark may be made upon it with a hair. The chart when placed in the instrument, as shown in Fig. 1, has a backing over only about one-half of its surface, consisting of a semicircular plate which may be seen in Fig. 2. The clock movement is contained in the round case behind this plate and is provided with an attachment for periodically vibrating the

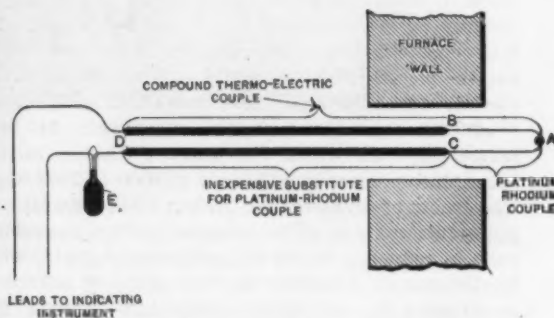


Fig. 4.—Diagrammatic Sketch of a Compound Thermo-electric Couple for High Temperatures.

The series of marks made by the periodic contact of the recorder arm removing the carbon from the chart gives a continuous diagram unless the changes of temperature are extremely rapid. After the record of the day is completed the chart is removed and its record made permanent by immersing it in a fixative solution. The latter consists of a small amount of concentrated fixative dissolved in gasoline or alcohol. After fixing the charts may be handled or filed without danger of destroying the record.

Fig. 2 is a reduced facsimile of a smoked chart with a record of the temperature in a lead bath, which is used for calibrating these pyrometers. It is interesting to note the constancy of the temperature during a period of nearly half an hour, while at night the mass of metal was cooling and passing from the molten to the solid state.

The simplicity of construction of the apparatus is claimed to insure durability, permanent accuracy and to make the instrument an easy one to use. The protecting case containing the galvanometer is hinged to the back of the recorder, and in Fig. 2 is shown turned to one side. This allows the recorder arm to be turned out of harm's way while charts are being changed and the clock wound.

The preparation of the charts is interesting. As has been mentioned, the coating of lampblack is thin, not sufficient to obscure the graduations, and the center and periphery are unsmoked. In packing, small separating disks are put between the centers of the charts and around the rim are perforations with turned up lips which keep the edges from coming in contact. This allows a box of charts to be handled and shipped without injury.

The thermo-electric couples employed for ranges not exceeding 2000 degrees F. are made of special alloys which are inexpensive and may be of almost any desired form or length to suit requirements. For ranges above 2000 degrees the standard Le Chatelier platinum and platinum-rhodium elements are used. Compound couples, as illustrated in the diagrammatic sketch, Fig. 4, are used to reduce the cost of high temperature couples, the inexpensive alloys being used for the extension of the fire end couple A. Their nature is such that the two thermo-electric effects at the junctions B and C with the platinum and platinum-rhodium elements neutralize each other if the temperature at these junctions does not exceed 1200 degrees F. The indications on the instrument will be the same as if the whole couple had been made of the precious metals.

Where there are varying temperatures at the cold end of the couple the mercury compensator E is used, which automatically changes the resistance of the circuit so that no correction is necessary for the working range of the recorder. This compensator was described at greater length in the previous article referred to, in the issue of May 17.

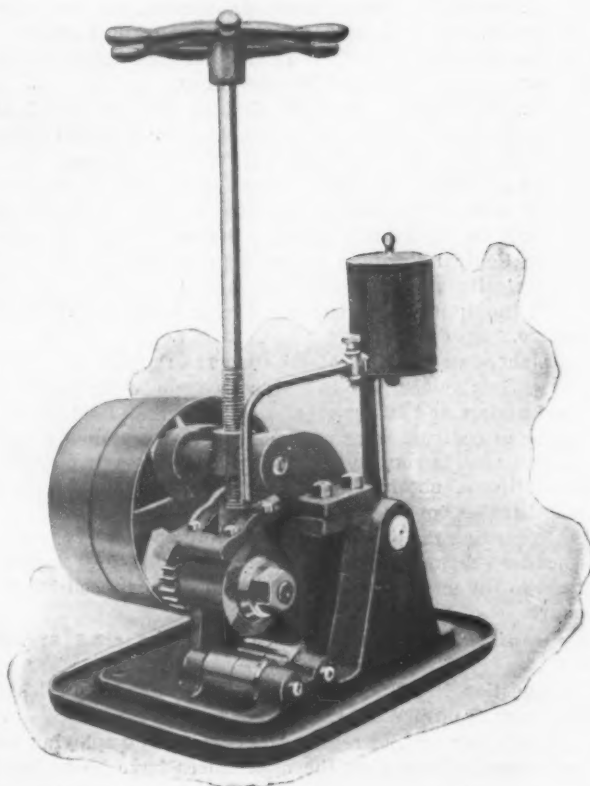
An ice locomotive propelled by steam engines and resting upon four great steel helices, one at each corner of the body, has been constructed and tested upon Lake Calhoun, Minn. The helices lie with axes horizontal, being of right and left hand pitch on the opposite sides. The outer edges of the coils are fashioned like skate blades in order to grip the ice. Each spiral is connected to a separate steam engine, this independent operation giving splendid control over the movements of the apparatus, which can be driven forwards, backwards, sideways or at any desired oblique angle. The model tested is 22 ft. long, weighs $4\frac{1}{2}$ tons, has engines aggregating 42 hp. and uses steel screws 27 in. in diameter. The steering is by means of two semicircular steel disks at each end of the body, operated by compressed air. These disks, which work in unison, are weighted, to better grip the ice. The bottom of the body is made watertight, so that should it chance to break through the ice it may float, in which case the spirals would act as propellers. Contrary to the usual experience with new pieces of apparatus, the anticipated speed of 9 miles per hour was much exceeded on trial, a maximum of 18 miles being reached. Obstacles and rough places were passed with surprising ease.

Tearing down buildings with a minimum waste of marketable material requires much care and judgment. The steel skeletons of modern buildings are most valuable, and are so carefully taken down that the modern house wrecker is able to restrict the loss almost entirely to the rivets. This old material is used in new structures, it frequently being found convenient to design the new structures with a view to using it. Where buildings are erected with the knowledge that they are to be demolished after serving a definite and short lived purpose, such as those used for expositions, the wrecking companies keep a careful record of the material which goes into the buildings, to be able to bid intelligently upon the contract for tearing them to pieces, and also to know

in advance just what material and in what sizes they will have available for sale or use when the buildings are finally razed.

The B. & K. Rolling Pipe Cutter.

A new product of the Bignall & Keeler Mfg. Company, Edwardsville, Ill., is the improved rolling pipe and tube cutter the construction and operation of which are clearly brought out in the illustration. The cutter shaft is driven direct from the driving shaft by cut gears. The cutter is lowered to bring it or feed it to the pipe by a long screw working in a steel nut and manipulated by a hand wheel on its upper end, and is retracted by the



A Power Driven Rolling Pipe and Tube Cutter Made by the Bignall & Keeler Mfg. Company, Edwardsville, Ill.

same means. The cutter disk is made of tool steel, carefully tempered, and is stiffened by a pair of steel flanges. The rollers are of relatively large diameter, which reduces their speed, and run on hardened steel pins. An oil reservoir and pan are furnished so that oil may be used if desired. The machines are made in two sizes, No. 1 cutting pipe from $\frac{1}{4}$ to 2 in. in diameter, and No. 2 pipe from 1 to 4 in. in diameter.

Recent tests show that steel pipe has much more resistance to torsion than has wrought iron pipe. Samples 6 ft. long were tested in an engine lathe, one end being caught in a four-jaw chuck, while the other was supported by the tail stock center, and the middle by the steady rest. A lever was clamped to the tail stock end of the pipe and supported by a spring balance at a radius of 3 ft. A $\frac{1}{2}$ -in. steel pipe gave a maximum pull of 190 lb. and twisted 15 turns before breaking, the weld remaining intact. The average pull with $\frac{1}{2}$ -in. wrought iron pipe was 65 lb. and the maximum 81 lb.; the average twist was two and one-half turns and the maximum five and three-quarter turns; the samples failed in the weld. With 1-in. steel pipe the pull was 300 lb., as against 256 lb. for iron; five and one-half turns against four and one-half for the iron; 13 per cent. of the steel pipes failed in the welds, as against 46 per cent. for the best lot of the iron pipe.

Machine Tool Builders and Apprenticeship.

Following is the report of the Apprenticeship Committee of the National Machine Tool Builders' Association presented at the fifth annual convention held in New York, October 9 and 10, by E. P. Bullard, Jr., chairman, and on which definite action is to be taken at the next annual meeting:

In order to make a thorough analysis of the apprenticeship systems now in use throughout the United States your committee addressed 100 representative concerns in this country inclosing a list of questions bearing on this subject. Fifty-nine of these letters were addressed to machine tool builders and 41 to other manufacturing concerns such as electrical manufacturers, engine builders, automobile manufacturers, &c., whom, for the sake of brevity, we shall hereafter term "the allied trades." Replies were received from 51 machine tool builders and 26 from concerns engaged in other lines.

For convenience we have divided the country into three geographical divisions—namely, New England, Middle Atlantic States and Central Western States. The replies coming from these various sections indicate that 66 per cent. of the concerns located in New England, 55 per cent. in the Middle Atlantic States and 62 per cent. in the Central Western States employ apprentices, and the majority of them enter into formal agreement to instruct the apprentices properly during a stated period of service.

Eighty-two per cent. of the concerns replying who had apprentices under the indenture system were machine tool builders and 18 per cent. were from the allied trades. Copies of contract were received from a great many and we find that in certain sections certain forms of contract are uniform, notably in Cincinnati, where the national metal trades contract has been adopted.

Regarding the questions which were submitted we will consider that question No. 1, "Do you indenture apprentices to the machinist trade?" has been answered by the above.

Apprentices Satisfactory from a Commercial Standpoint.

Question No. 2. "Have such apprentices proved satisfactory from a commercial standpoint?"

Ninety per cent. of replies from concerns employing apprentices indicate that the apprentices have been found satisfactory from a commercial standpoint, whereas 10 per cent. replied in the negative.

At this point it may be of interest to state that the writer investigated this particular phase of the apprenticeship system very thoroughly in the works of the Bullard Machine Tool Company and finds that apprentices do pay, even when working in opposition to skilled journeymen. In reaching this conclusion records were taken from the piece work department covering operations which had been performed by apprentices and by journeymen machinists. Approximately 1000 of these records were taken and the calculations were based on the apprentice labor cost plus a fixed hourly expense charge, which was the same for both machinist and apprentice. This method of figuring showed conclusively that while the apprentice in certain cases takes longer to do a given operation the lower labor cost at which he is working is sufficient to give him the advantage in the total cost represented by labor and expense. Moreover, it is apparent from the records which we secured that the apprentice does not always take longer to perform a given operation, and frequently, owing to having been thoroughly instructed, he is able to accomplish more in a given time than the journeyman machinist. These cases were all based on piece work records extending over a period of several years. The Bullard Machine Tool Company finds that the best journeymen it has were trained as apprentices in its own plant. From replies we should judge that this had been the experience of the majority having had the apprenticeship system in force for any considerable period of time.

Rates of Apprentices to Machinists.

Question 3. "What is the approximate ratio between the number of apprentices and machinists employed?"

The replies to this question are more difficult to analyze. The percentages range all the way from 2 per cent. as a minimum to 33 per cent. as a maximum, the average being about 18 per cent. In the allied trades we find that the range runs from 5 to 20 per cent. and averages about 13 per cent. These figures may be somewhat misleading, as we have assumed that the concerns not replying did not employ apprentices.

Of the 29 manufacturers who employ apprentices under verbal agreement only 70 per cent. are machine tool builders and 30 per cent. engine and machine manufacturers. Of the 13 concerns who reported employing no apprentices at all 23 per cent. were machine tool builders, while 77 per cent. were of the allied trades. The International Association of Machinists limits the number of apprentices to 12½ per cent. of machinists employed.

It will thus be seen that the machine tool builders are turning out men for other people to use, as there are many large concerns which employ no apprentices at all and yet have a large number of machinists. It would be well to note further that the machine tool builders themselves are not employing as many apprentices as they should, as there is hardly a concern represented at the National Machine Tool Builders' convention which has not increased its force more within the past few years than the total number of apprentices which have been employed at any one time.

We find that automobile manufacturers as a rule do not employ apprentices, but a number of them have expressed themselves as favorable to such action as the machine tool builders may take regarding this matter and desirous of being kept informed in relation thereto.

Question No. 4. "Have graduate apprentices of your works been advanced to positions of authority while in your employ?"

Eighty-five per cent. of our replies would indicate that they have and 15 per cent. are in the negative. No comment would seem necessary, as it is self-evident that if a concern cannot train boys so that they are qualified to take responsible positions in their works there must be something radically wrong with their system and method of instruction.

Difficulty in Securing Intelligent Apprentices.

Question No. 5. "Is difficulty experienced in securing a sufficient number of intelligent apprentices?"

Seventy per cent. of the replies indicate that there is, while 30 per cent. indicate that there is no particular difficulty. A peculiarity of the replies to this question, taken in conjunction with the wages paid by various concerns, is that the concern paying the minimum wage of 3 cents per hour at the beginning of apprenticeship contract and having a four-year course with a maximum of 10 cents per hour is able to secure a sufficient number of apprentices and to have 20 per cent. of apprentices, as compared to journeymen machinists, while several concerns paying higher wages report considerable difficulty in getting enough boys. We consider this question of the utmost importance, as the problem at the present time is apparently to offer sufficient inducement for desirable boys to learn the machinist trade.

It is obvious that the wages paid in one section will vary from those paid in another. It is also apparent that a concern having a reputation for producing good work and having clean, healthy shops, should be able to secure boys with less difficulty than a concern having the reverse conditions. It is also a question whether wages will attract the right kind of boys. Parents having the future interest of their sons in mind should be more solicitous to know that the shop conditions are good and that the boys will have an opportunity to learn the trade thoroughly under competent instructors than to insist on high remuneration.

We find that the term of apprenticeship varies from three to four years and that the wages run from 3 to 12½ cents per hour for the first year, from which we conclude that the employer in the former case is either able to get more boys than he needs or is satisfied with a lower standard than the one who pays something over four times as much.

School Training.

Question No. 6. "Are applicants required to have a specific amount of previous school training?"

Eighteen per cent. stated that they insisted upon a certain amount of special training, and one-half of those qualified their reply by stating that they require a common school education only, as it is difficult, if at all possible, to obtain boys who were grammar school or high school graduates.

Question No. 7. "Are courses of instruction provided for apprentices during their term of service?"

To this question 8 per cent. replied in the affirmative. Others reported that they did not provide courses of instruction, but urged the attendance of their boys at night schools or the taking up of correspondence courses. In one instance the employer pays one-half the tuition, while another, who does not provide the course, offers it as a premium for good service. Four concerns maintain regular schools in connection with their plants and provide competent instructors free of charge. Two of this number give instruction during the day and count the time so spent on the apprenticeship contract. The other two require attendance during the evening.

Question No. 8. "Is attendance on these courses compulsory?"

Of the 8 per cent. who provide courses of instruction, 6 per cent. make it compulsory, while the others simply request it.

Question No. 9. "Are apprentices under the charge of a special instructor while employed in the works?"

Fifteen replies in the affirmative were received to this question, 11 of the concerns having indentured apprentices. Many replying in the negative stated that the boys are placed in charge of the department foremen, or expert journeymen, who oversee their work and are supposed to give them proper instruction. In general the majority of answers are interpreted to mean that the foremen of the departments are the special instructors who have charge of the boys. One concern, we understand, employs a man to take entire charge of the boys, he having authority over them both in and out of the works.

Some Details of Shop Practice.

Question No. 10. "Are apprentices permitted to work on either the premium or piece work systems?"

In answer to this question 54 replies were received, 26 in the affirmative, 9 stating that they followed this system in part, 1 allowing the boys to work under this rule after the first year, 1 after the second year and 1 during the fourth year. Of the negative replies four reported that piece work or premium systems were not in use in their plants.

Question No. 11. "Are small tools provided for their use free of charge?"

Eighteen replied in the affirmative, and 38 in the negative. Five reported providing toolroom tools only; 1 that it provided tools to the value of \$25, which was deducted from the bonus of \$100 presented at the end of contract; 1 furnished tools at wholesale prices, or on the installment plan, while another presented the tools at Christmas.

Question No. 12. "Are inducements of either shorter time or increased pay offered to technical graduates to learn the machinist trade?"

Seventeen replied in the affirmative and 34 in the negative. Those replying in the affirmative stated that they increased the wages or cut the time, also offering the opinion that technical schools give false ideas as to salary and position which graduates can command. We will quote from the negative replies: "Do not believe technical education good for the apprentices or for us;" "Technical graduates do not wish to learn the trade;" "Technical graduates think they know much and demand much."

Special Apprentices.

Question No. 13. "Do you indenture apprentices to the various branches of the trade, such as lathe work, planer work, &c.?"

Twelve per cent. replied in the affirmative. One concern that does not indenture apprentices makes specialists almost entirely, stating that these specialists are sometimes changed to other departments, but not often.

Another concern makes grinding specialists in addition to taking regular apprentices. A prominent lathe maker takes apprentices to the planer and erecting departments in addition to regular apprentices. A planer manufacturing company takes special apprentices to the planer department. Several others take special apprentices.

Question No. 14. "Is any provision made for these special apprentices to become regular apprentices, should they desire, after having completed their special apprenticeship?"

Several concerns make such provision, but it is not universal.

Having now considered these various questions and replies in detail we believe it desirable to present the following synopsis, which may serve to place the matter more clearly before you:

Synopsis of the Replies.

1. The majority of machine tool builders have established apprenticeship systems, which are in more or less satisfactory operation. A smaller percentage of the allied trades have some system, but one large industry, the automobile manufacturers, with one exception, employs no apprentices.

2. Apprentices have proved satisfactory from a commercial standpoint.

3. The approximate ratio between the number of apprentices and journeymen employed by the machine tool builders is about 18 per cent., whereas the allied trades do not average over 13 per cent.

4. Graduate apprentices have been advanced to positions of authority in many shops. Some concerns state that their foremen come almost entirely from this class.

5. All reports indicate that difficulty is experienced in securing a sufficient number of intelligent apprentices. It seems, however, that the questions of wages and time of service have little effect on this question.

6. But few concerns require a specific amount of previous school training, the majority requiring a common school education only.

7. As a general rule courses of instruction are not provided for apprentices.

8. Those who do provide such a course make attendance compulsory.

9. Apprentices are usually under the direct charge of the foreman of the department.

10. About 50 per cent. of the concerns employing apprentices permit them to work under either the premium or piece work systems.

11. Thirty-three per cent. provide small tools free of charge.

12. Thirty-three per cent. offer special inducements to technical graduates, but state that they find it difficult to secure them.

13. Twelve per cent. state that apprentices are taken to the various branches of the machinist trade.

14. But a small percentage of the above make provision for special apprentices to become regular apprentices after having completed their special course.

This problem then resolves itself into the following: Having an insufficient number of skilled workmen we can only increase this supply by teaching the machinist trade to an increased number of boys. Finding difficulty in procuring a sufficient number of boys for this purpose we must offer inducements which will attract them to the trade. We would therefore suggest:

Suggestions.

First, the drafting of uniform apprenticeship contracts covering both regular and special apprentices to be binding both to the employer and employee, the former to be obliged to instruct the latter properly in the branch or branches of the trade specified in the contract, and we suggest that the articles of indenture provide sufficient guarantee on the part of the apprentice for the satisfactory completion of his time of service, the wages paid to be optional with the individual employer. We believe this point is essential, as it is apparent from our investigation that apprentice wages vary in different sections of the country. It would seem advisable, however, to have a uniform term of service in all cases, to be based on the time found necessary by previous experience to

properly teach the branch or branches of the trade specified in the contract.

The number of apprentices employed in any shop should be limited only by the ability of the employer to instruct them properly.

Graduate apprentices should be advanced wherever possible and preference given them in making promotions.

Special apprentices, or those indentured to one branch of the trade only, should have a common school education, and regular apprentices, or those indentured to the full trade, to have at least a grammar school education.

Courses of instruction for apprentices during their term of service should be provided where practicable, and attendance upon such courses, where provided, be made compulsory. High school and technical graduates should be exempt from special study during their term of service. A special instructor should be provided where practicable.

Apprentices should be permitted to work on the premium or piece work systems. All small tools should be provided for their use free of charge, these to be furnished new on completion of their trial period, and presented to them on the satisfactory completion of their term of apprenticeship. These tools should be inspected by an authorized official at stated intervals and the condition reported. These reports would be valuable in determining the interest and ability of the apprentices.

Technical graduates should be encouraged to indenture themselves to the trade by offering higher wages and shorter period of service. Influence should be brought to bear upon those in authority at the technical schools to impress upon them the demand in the machine tool business for men having a technical education and willing to learn the practical side of the business.

Indenture apprentices to the various branches of the machinist trade, making the term of service short and wages relatively high. Offer bonus or reward for the satisfactory completion of apprenticeship.

Offer an opportunity for special apprentices to become regular apprentices, should they so desire on the completion of their special apprenticeship, the time so served applying on the regular apprenticeship course in proportion as may be thought advisable.

Finally, issue a diploma bearing the seal of the National Machine Tool Builders' Association to both regular and special apprentices stating clearly the work accomplished during term of service.

If a new railroad ticket printing machine works as well as its inventor claims it will revolutionize the present system of selling tickets. The machine is intended to print on heavy cardboard tickets containing the names of the stations of departure and destination, the date of issue, number of the register, class to be used, difference for single and round trips, and the exact amount of the fare. On a second strip of cardboard within the machine is printed simultaneously a duplicate ticket, thus furnishing complete registration for every ticket sold. Several of the machines are in experimental use by the Italian government. The capacity of the machine is about 400 different kinds of tickets. As the agent by a few turns of his hand prints the ticket requested a disk appears showing the prospective passenger the amount of the fare. This machine is designed to obviate the necessity for carrying in stock thousands of tickets of all sorts with the great care and attention involved in keeping them in order.

The export duty on coal, levied by Great Britain since the beginning of the Boer war, has been abolished, effective at midnight October 31. At that time hundreds of coal laden vessels, which had been waiting for the event, left British ports for foreign destinations.

The New York branch of the Associated Foundry Foremen met at the Grand Union Hotel, New York, on the evening of October 27. Dr. Richard Moldenke, secretary of the American Foundrymen's Association, addressed the meeting. The next meeting will be held at the same place on Saturday evening, November 17.

September Iron and Steel Exports and Imports.

The September figures of the Bureau of Statistics of the Department of Commerce and Labor show a decided falling off in exports. The total value of exports of all kinds of iron and steel and manufactures thereof, not including ore, in September was \$13,891,472, against \$15,309,057 in August. The commodities for which quantities are given aggregate a total of but 89,319 gross tons, against 111,260 tons in August, 98,409 tons in July, 107,585 tons in June and 136,592 tons in May. Taking such commodities the following table gives the exports for September and for the nine months ending with September in 1906 and 1905:

Exports of Iron and Steel.

Commodities.	September,		Nine months.	
	1906.	1905.	1906.	1905.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron.....	4,521	2,443	60,415	36,206
Scrap	986	1,337	9,254	6,129
Bar iron.....	4,227	2,381	41,984	24,618
Wire rods.....	124	810	5,677	4,445
Steel bars.....	2,675	3,002	22,425	16,902
Billets	8,023	25,452	170,462	152,076
Hoops and bands....	387	509	3,376	2,469
Iron rails.....	.....	.....	.....	.....
Steel rails.....	18,201	29,180	250,278	210,248
Iron sheets and plates	1,995	1,054	10,506	5,400
Steel sheets and plates	7,998	4,085	68,483	46,019
Tin plates andterne plates	228	354	10,622	6,501
Structural iron and steel	9,285	6,196	83,891	56,200
Wire	13,843	8,730	126,293	98,630
Cut nails.....	606	975	5,980	6,638
Wire nails.....	3,455	3,039	37,381	28,228
All other nails, including tacks.....	454	272	3,684	3,122
Pipes and fittings*....	12,321	13,238	110,653	.....
Totals.....	89,319	103,057	1,021,364	712,831

* Quantity not stated prior to July 1, 1905.

The total value of the imports of iron, steel and manufactures thereof, not including iron ore, in September was \$2,832,199, against \$2,623,677 in August. The total imports of commodities for which quantities are given were 39,679 gross tons in September, against 34,112 tons in August, 52,715 tons in July, 41,038 tons in June and 45,706 tons in May. The imports of such commodities for September and for nine months ending with September in 1906 and 1905 were as follows:

Imports of Iron and Steel.

Commodities.	September,		Nine months.	
	1906.	1905.	1906.	1905.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron.....	26,711	25,836	229,876	152,651
Scrap	208	411	10,511	8,680
Bar iron.....	1,931	3,248	25,607	26,194
Rails	854	2,421	3,376	14,288
Hoop, band and scroll	61	355	9,942	2,165
Billets, slabs, bars, &c., steel in forms n.e.s.	1,288	965	14,977	10,505
Sheets and plates....	190	187	2,630	1,684
Tin plates andterne plates	5,811	4,653	37,755	54,982
Wire rods.....	1,242	1,398	13,444	12,732
Wire and articles made from	531	227	4,384	2,811
Structural iron and steel	852	3,257	25,704	7,921
Totals.....	39,679	42,958	378,206	294,613

The total value of exports, not including ore, in the nine months ending with September was \$127,189,673, against \$102,922,277 in the corresponding period of the previous year. The total values of the imports, not including ore, for the same periods were \$24,376,880 and \$19,565,755, respectively. The quantity of iron ore imported in the nine months ending with September was 818,030 gross tons and the quantity exported was 234,310 tons.

An article is going the rounds of the press stating that a new process for the manufacture of steel is to be introduced in the works of the Colorado Fuel & Iron Company at Pueblo, Colo. The statement is made that the process is expected to revolutionize the steelmaking industry. We are advised that this report is entirely without foundation.

The Bridgeport Combination Dry and Wet Grinder.

In small shops or crowded ones where it is desirable to do a variety of grinding on one machine, the combination dry and wet grinder herewith illustrated, and built by the Bridgeport Safety Emery Wheel Company, Bridge-

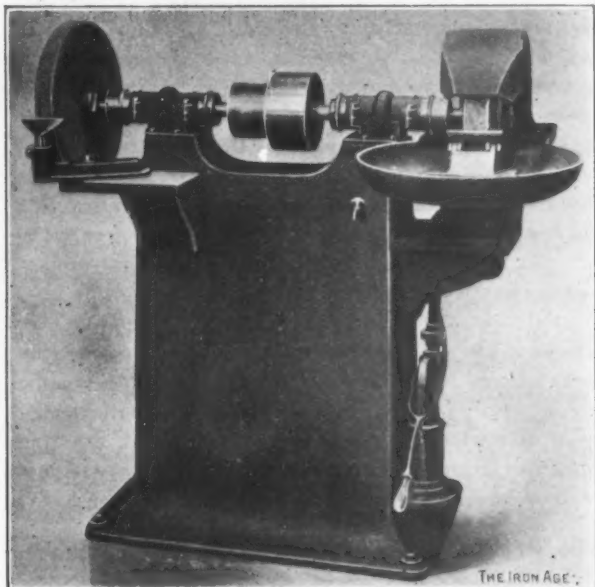


Fig. 1.—The New Combination Dry and Wet Grinder Built by the Bridgeport Safety Emery Wheel Company, Bridgeport, Conn.

port, Conn., is especially serviceable. The machine is made in three sizes, carrying wheels 16, 20 and 26 in. in diameter respectively, and either in belt driven form, as shown in Fig. 1, or with direct motor drive, the motor being mounted between the bearings in the space occupied by the cone pulleys in the machine illustrated.

The dry grinding end is intended for grinding small pieces, such as castings or any rough work, and is ar-

used in connection with the dust collars at the end of each bearing, which are positive in their action in taking up all end play.

The equipment for wet grinding is interesting. On the inside of the base there is cast as part of the base a large water tank, A, Fig. 2, which is airtight. Connecting with this tank is a pump, B, which forces air through a pipe C to the space over the surface of the water. This displaces the water, causing it to rise through a pipe, D, into the upper tank E, under the wheel, and as much or as little water may be obtained on the wheel as desired. Opening the air cock F in the front of the machine relieves the air pressure and allows the water to drain from the upper tank under the wheel back to the main tank inside the base. What sediment comes from the grinding settles to the bottom of the upper tank, and only enough water is let out, as indicated by the water level shown at G, to leave the wheel dry. Standing in water makes a wheel heavier on one side, so that when it is started up it is out of balance until the wheel has become uniformly wet all around its circumference. The sediment that collects can be easily taken out when a new wheel is put in. As the pipe inside the tank in the base does not run down to the bottom, and as comparatively clear water runs back into this tank, it does not have to be cleaned oftener than about once in five years.

To fill the tank when the machine is installed it is only necessary to open the air cock and pour water into the bowl of the tool grinder until it begins to run out of the air cock. This will give a supply of water that will last a long time.

The base of the machine illustrated is 34 in. long by 19 in. wide and the height from the floor to the center of the spindle is 40 in. The greatest over all dimensions are: width, 50½ in.; depth, 27¼ in., and height, 48 in. The weight of this, the 16-in. grinder, is 1100 lb. Those with the 20 and 26 in. wheels respectively, weigh 1250 and 1500 lb., and their over all dimensions are correspondingly larger.

The Link-Belt Company has recently opened an office in room 913 Missouri Trust Building, St. Louis. E. C.

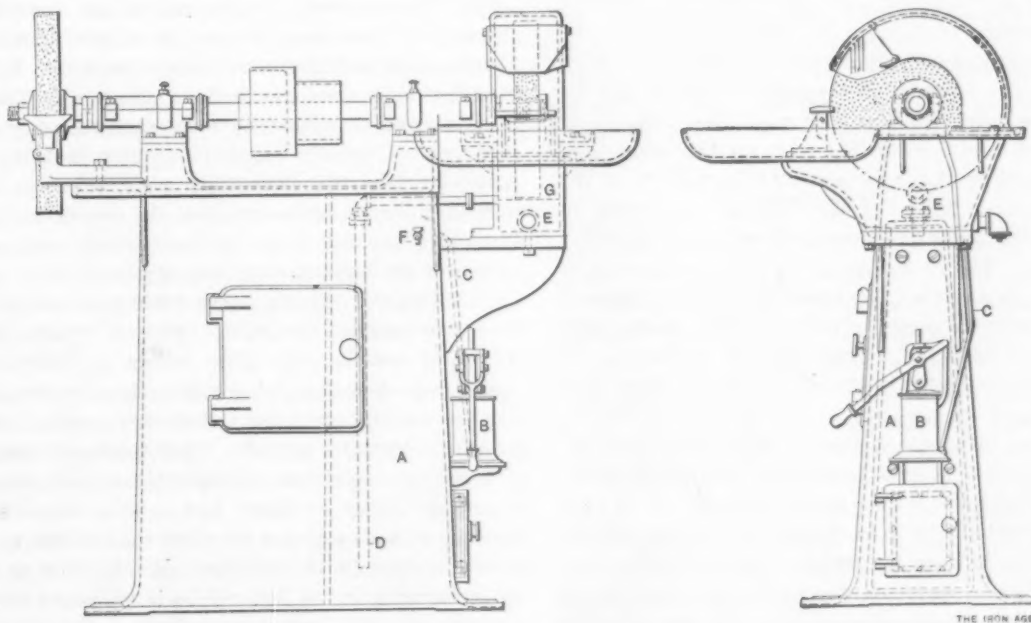


Fig. 2.—Side and End Elevations of the Bridgeport Combination Grinder, Showing the Water-Cooling Provisions.

ranged, if desired, with a small surfacing table over the wheel for doing small surfacing work. The other end is particularly arranged for tool grinding, with cooling water provided to prevent drawing the temper of tools.

The bearings for the wheel spindle are phosphor bronze lined, the boxes being split removable sleeves with ring oiling arrangement, which are easily renewable when worn. Each bearing has a large oil reservoir and an oil return from each end of the bearing. Ring check nuts are

Berghoeffer, an engineer of long experience with the Chicago house of the company, is in charge.

The Pennsylvania Railroad Company's declaration of a semiannual dividend of 3½ per cent., made November 1, marks the highest rate of dividend paid by this company since 1881. From that date the rate has averaged between 5 and 6 per cent.

to the share of an experienced journeyman. Where apprentice systems were in existence when the present rush of manufacturing began they have usually been extended. Some works are re-establishing the system, others propose to do so immediately, and yet others plan to take up the matter as soon as the present strain is over, arguing that business conditions are liable to change before a body of apprentices could be developed to the point of usefulness. Yet it should be remembered that the kind of boy who binds himself to serve an apprenticeship as a machinist is usually more valuable in a shop than the green workman of more mature years.

A Square Deal in Roofing Plates.

We congratulate the tin roofers of the United States; we congratulate the architects and the public; we unequivocally record our approval and hearty commendation of the courageous stand now occupied by the manufacturers ofterne plates upon the insistence that the tin plate business shall stand upon the rock foundation of "the square deal." *The Iron Age* takes pride in reciting that this industry, which, since the enactment of the McKinley bill, has come to be regarded as a monument to the skill, energy and sagacity of American ingenuity, is among the first, without coercion, to catch up the war cry of the twentieth century and in its refrain announce to the world that the proper conduct of business demands a high moral standard.

The sale of roofing plate is to be revolutionized. For decades, for a century or more, this article of commerce has been sold by private marks, by twisted, thread-worn meaningless appellations, such as "Old Style," "Old Method," "Redipped." In early days, no doubt, these terms meant something, but in the scramble for business through these long years they have become hopelessly confused, and the buyer of roofing plate has found himself groping about with a bewildered and faltering step among the honest or dishonest assertions of this salesman or of that. All this is to be changed—the architect, the roofer or the house owner, provided only he can read—is to be able to secure precisely what he pays for, and is to be able himself, without any technical knowledge, to determine this point absolutely.

The American Sheet & Tin Plate Company officially announces that it has decided, on all of its brands of roofing plate, to stamp each sheet with the amount of coating it carries per box of 20 x 28, and not only this, but every waster plate is to be stamped "waster." This will in a large measure prevent the possibility of misrepresentation in second, third or fourth hands and insure to the one calling for such a plate a square deal. That the company which has taken the initiative in this innovation runs some risk of a loss of business during the period when architects, builders and roofers are being made familiar with such a frank statement of quality must appear evident to all who give more than superficial attention to the far-reaching action. The move strikes at the very heart of the industry. It concedes to the tin roofer more than he has asked; it crushes the malpractice of years in one fell stroke, and with firm grasp uplifts the business to a plane of dignity and honor. As such it enforces co-operation, it demands the support of all manufacturers, of all roofers, of all architects, of all builders.

Eliminating single interests, a broad view of this bold advance leaves no doubt that the integrity and plane of the whole roofing industry will be raised by simple co-operation.

Standardizing Machine Tools.

Much progress has been made in the standardization of certain parts of machine tools, under the influence of the National Machine Tool Builders' Association, but there are still not a few manufacturers who have not accepted this change in practice. The user of machine tools is naturally greatly benefited by a system of standardization which cheapens the cost of his equipment and facilitates the processes of manufacture.

Take, for instance, the size and thread of a lathe spindle. If each make of lathe has a different standard the user of tools is obliged to have a complete set of chucks for every kind of lathe, which is costly and oftentimes inconvenient. If, on the other hand, a chuck should fit any lathe, this effects a material saving and benefit. The same is true of the taper of lathe spindle and tailstock. The builders of drilling machines have generally adopted a standard taper, and the lathe builders are one by one following along in the general movement toward standardization, though not so rapidly as users of their machines would wish. The dealers state that it is becoming an important selling point of a lathe to have it standardized. Buyers are learning the advantage of the interchangeability of chucks, reamers, drills, &c., between lathes of various makes as they enter into shop equipment, and the tool builder who sticks to a different spindle thread and taper is at somewhat of a disadvantage in the market. This is an important point to consider. It does not matter so much at this particular time under present conditions of business, but the day will come when every such point will count in making sales.

The attempt to standardize the motor drive has not yet been accomplished in machine tool practice. It cannot very well be brought about until the various makers of motors arrive at some sort of standard among themselves, and they are far from that condition at the present time. The shapes and sizes vary materially, and each must have its own pattern of lathe fixture to take it. Perhaps time will also bring about this standardization, but the prospects are not favorable. It may be looking for too much to expect the manufacturers of electric motors to agree among themselves to adopt a standard size and form, nor is it likely that machine tool builders will agree to use a single type of motor.

Sending a Tariff Commission to Germany.

The action of the Administration at Washington in deciding to send a commission to Germany to look into the question of a modification of American tariff regulations as applied to German products will appeal to many of our manufacturers. Their business will be injured if on April 1 next the German Government shall put into effect a new and materially higher tariff on American goods. It was necessary that this Government should assume an attitude other than that of passivity and take serious steps toward discovering wherein it may be possible to meet the Germans half way on the tariff question. It may prove not to be possible, yet the United States will be in a better position to have tried and failed than never to have tried at all. The German market for American goods is not only important but is growing, and metal lines, including machinery, will suffer if the present status shall be changed with the expiration of the extension of time which the German Government granted. The question is a delicate one, but it may be hoped that it will be amicably settled to the good of both countries.

CORRESPONDENCE.

The Invention of the Hydraulic Jack.

To the Editor: I noticed this morning the reference on page 1174 of *The Iron Age* for November 1 to the hydraulic jack, and apparently giving credit for this design to Sir Richard Tangye. He was not the original designer of the hydraulic jack, but only of a type of jack which was not even the second type of jack to be covered by a patent.

The first type of hydraulic jack which is popularly known as such was invented by Richard Dudgeon, a resident of New York about 1848 or 1849, and was patented in England previous to Mr. Tangye's so-called invention. The latter's type of jack was also antedated by patent in this country taken out by J. Robertson, the proprietor of the Tubal Cain Iron Works of Brooklyn, N. Y., and the English jack was declared in this country as an infringement of Mr. Robertson's patent and could not be used here until after the expiration of this patent, although Mr. Robertson had sold out his interest in the patent when but few of them had been made. This company was interested in both of these jack patents which antedated the Tangye.

F. H. STILLMAN,

President of the Watson-Stillman Company.

NEW YORK, November 1, 1906.

The Gayley Dry Blast and German Engineers.

To the Editor:—While the indefinite extension of discussions such as that provoked by my letter in *The Iron Age* of October 25 is undesirable from any point of view, some reply from me seems to be necessary to the letter of F. E. Junge in *The Iron Age* of November 1. Mr. Junge seems to have missed the spirit of my letter so completely that an adequate reply to him would be unduly extended, so I will, for brevity's sake, accept his statement of the cardinal point of the whole matter, namely, the determination of the value of the dry blast process from the scientific and commercial viewpoints.

Mr. Junge requests that if I "understand the reason for the saving claimed by the Gayley process," I will impart "such valuable knowledge to other students of the problem whose business it is to advise other people not conversant with the subject of its merits and demerits." My first suggestion would be that no one should undertake to advise others on an important subject like this without first obtaining some reliable knowledge of it, and in further answer to Mr. Junge's request I will say that in the last edition of *Iron, Steel and Other Alloys*, by Prof. H. M. Howe, that pre-eminent authority has given an explanation of the action of the dry blast so clear, logical and complete, even to the development of a mathematical formula for the general case, that there seems to be no room for further doubt and very little for further discussion. This work has now been in print for several months. Moreover, an article was published in *Le Chatelier's Metallurgie* in the summer of last year in which the same explanation is outlined, and the same paper in English was published in the bi-monthly *Bulletin of the American Institute of Mining Engineers* last autumn. An extended review of this last paper was also published in the second volume of the *Journal of the Iron and Steel Institute* of last year.

It would seem as though a metallurgist who discussed international questions of this character could have no good excuse for not having seen some one of these explanations. But as if this were not enough, the original of Professor Osann's article as published in *Stahl und Eisen* contained the clearest evidence that Professor Osann had seen this explanation, but rejected it without having taken the trouble to understand it. If this is not "ignorance so gross as to seem almost intentional and certainly inexcusable," in a man who lays claims to be a scientist, what is? Moreover, if Professor Osann's ignorance or denial of this new theory of the blast furnace, which has largely revolutionized the opinions on this subject held in this country, and which is in absolute agreement with the facts, does not make Professor Osann's agglomeration of figures based upon incorrect assumption a "hotch potch of learned nonsense," will

Mr. Junge kindly explain what he understands by this term?

In regard to approaching this question in a spirit of disinterested inquiry and without international prejudice, Mr. Junge is certainly correct, but the advice comes badly from him or from Professor Osann either, since both have begun by denying the proved and established facts concerning the results of the dry air blast; and the power required for, and saved by, the process. My admonitions were especially directed at "engineers in Germany and elsewhere" who had adopted this attitude, and my intention was to show that the spirit of American engineers was not one of supercilious superiority, but that they were quite content to allow others to work out metallurgical problems in their own way and time.

Mr. Junge's concluding paragraph concerning the purchase by the Steel Corporation of 100,000 hp. of gas engines, all of which, as I understand, have been "re-designed by American engineers and adapted to the purposes of American metallurgical practice," seems to be all the confirmation that I could ask of my concluding paragraph suggesting that in their own good time American iron masters would do this very thing.

In short, if anything further had been required to convince me that my first letter was needed and was correct Mr. Junge's letter of October 29 has supplied the proof.

J. E. JOHNSON, JR.

GLEN WILTON, VA., November 3, 1906.

Labor Conditions in Germany.

To the Editor: Having read the article in *The Iron Age* of September 6 dealing with "The Labor Situation at Home and Abroad," it strikes me that while there is so much talk about the scarcity of labor, both in the United States and Great Britain, here in Germany, or at least in this corner of the German Empire, we are fully in as bad condition, being practically unable to get a supply of workmen sufficient to cope with the demand. I am the manager of an iron and steel trading company and have frequently had complaints from my warehouse superintendent to the effect that he had only been able to secure six or eight laborers out of the 20 required. It seems, however, less difficult to find skilled men in this part of the world.

P.

DANZIG, October 19, 1906.

Labor Notes.

A special meeting of the National Association of Erectors of Structural Steel and Iron, comprising the leading bridge companies and builders of steel buildings, was held November 2 in New York, and the open shop policy of the association was affirmed. It was said that overtures had been received both from the International Association of Bridge and Structural Iron Workers and the House-smiths' and Bridgemen's Union of New York and various local unions asking for a conference to discuss the present state of the trade, but the association decided not to confer with any unions, believing that it had won the open shop fight. It was said also that the association will back up the United States Steel Corporation, against which a strike has been declared at Gary, Ind., on the new plant it is building.

A conference was held November 2 at the Hotel Belmont, New York, between officials of the Southern Railway, the International Association of Machinists and representatives of the Conciliation Committee of the Civic Federation. It was agreed that the machinists, who are on strike in all the machine shops of the Southern Railway for higher wages and other conditions, should return to work pending a settlement of the demands by arbitration. The Arbitration Board is to consist of one man to be selected by each side, the two to elect a third man. The decision of the board is to be binding on both sides. The board will likely hold its sessions at Atlanta, Ga.

The steel rail mill of the Dominion Iron & Steel Company, Sydney, N. S., made a new record in October, with a total output of 24,600 tons. By the end of December it is expected the mill will have an output of close to 30,000 tons a month.

Customs Commission to Berlin.

WASHINGTON, D. C., November 6, 1906.—The special commission appointed by President Roosevelt to go to Germany to discuss with a similar commission to be appointed by the Berlin Foreign Office the questions in controversy between the two governments respecting the enforcement and amendment of the customs administrative laws of the United States left Washington to-day, and will be absent two months. The members of the commission are S. N. D. North, director of the census; James L. Gerry, chief of the Customs Division of the Treasury Department, and N. I. Stone, tariff expert of the Department of Commerce and Labor. It would have been difficult to select a commission better equipped for the work in hand than that which President Roosevelt has appointed. Mr. North has had a varied experience in tariff matters and has assisted the Congressional committees in the framing of several of the more recent tariff laws. Mr. Gerry is the accomplished chief of the Customs Division and is probably the leading expert on customs administrative affairs in the country. Mr. Stone has for several years made a special study of foreign tariffs and international customs relations and possesses a large fund of exact information that will be of much use to the commission.

Well Received by Germany.

The appointment of this important commission is the result of the efforts of the Secretary of State, Mr. Root, to reach an understanding with the German Government as a basis for the continued application of the minimum rates of the new German tariff to American products after July 1 next. Cabled advices from Berlin indicate that the appointment of a commission has been received by the German Government with great satisfaction, and the way has been paved for a series of conferences that will no doubt be productive of excellent results, not only with respect to the commercial relations of the United States and Germany, but also with reference to our intercourse with other important countries of the world, all of which will, of course, be equal beneficiaries with Germany of any concessions that may be made by the Treasury Department or by Congress in our customs laws and regulations.

The North Commission, as it will be called, will be accredited directly to the American Embassy at Berlin, and the American Ambassador has already taken the preliminary steps to arrange for the coming conferences. The American Commissioners will receive from their German colleagues an outline of the changes desired by Germany in our customs requirements and will then visit the leading chambers of commerce and other commercial bodies in the chief cities of the Empire. The commission will not be authorized to pledge the United States to any particular changes in the laws and regulations, but after an investigation and full discussion will prepare a series of recommendations, which will doubtless be submitted first to the Secretary of State and then to the Secretary of the Treasury.

Amendments of Customs Regulations.

Such suggestions for the amendment of the customs regulations presented by the commission as may be approved by the Secretary of the Treasury will at once be promulgated and the amended regulations forwarded to American consuls throughout the world. It is assumed that the most important recommendations of the commission will relate to changes desired in the statutes, and such of these suggestions as meet the approval of the Administration will be forwarded to Congress at the earliest practicable date. As the commission will be absent two months it will not be possible to present the desired amendments to Congress until that body reconvenes after the holiday recess. Action must then be taken before March 4, the date of the adjournment of the present Congress, in order to avoid a very embarrassing situation when the *modus vivendi*, under which we now enjoy the minimum rates of the German tariff, expires.

The most important changes desired by the German Government in our present customs practice are, first, the establishment of a margin of 10 per cent. for non-

penalized undervaluations; second, the assessment of duty on invoiced valuations declared "for export," instead of on market value for domestic consumption, and third, the authorization by law of open hearings in all reappraisal proceedings before the Board of United States General Appraisers.

The first proposition presents no difficulties to the Treasury Department and is already embodied in the customs administrative bill which passed the House at the last session and is now pending before the Senate Finance Committee. Irrespective of the desires of Germany, the Treasury Department has for some time past been convinced that a margin of 5 per cent. in all cases and 10 per cent. in some cases is really necessary to provide for honest differences of judgment in the valuation of imported merchandise. Secretary Shaw specifically recommended this change last winter and the House agreed to it without discussion.

The "Export Valuation" Problem.

The second proposition is a far more serious problem. Treasury experts believe that if duties are to be assessed on export valuations, instead of on regular market value for domestic consumption, the door to fraud will be thrown wide open and appraising officers will be helpless to prevent the flooding of the country with merchandise paying only a fraction of the rates contemplated by the existing tariff law. The Treasury Department has for many years struggled with the problem of assessing values on consigned goods which are usually claimed to have no regular domestic market value in the community in which they are produced, and has met with only a fair degree of success in collecting duties. If the export valuation method should be authorized it would, of course, extend to imports from all countries, and the results can better be imagined than described.

The authorization of open hearings before the Board of General Appraisers is regarded by Treasury experts as anything but the simple question which on its face it appears to be. The Secretary of the Treasury some months ago authorized the Board of General Appraisers to grant such hearings "where practicable," but of course it is as to the particular cases in which open hearings are refused that the most important controversies are likely to arise. While the Department admits that it appears to be a fair contention that the representatives of the importers should have an opportunity to cross examine witnesses who testify regarding the values of their importations, yet, on the other hand, Secretary Shaw and his aides declare with much emphasis that if the Department's channels through which confidential information regarding values is now secured are thrown open no more information will be available and the defrauding of the revenues will be greatly facilitated. It is quite possible, however, that a fair compromise upon this question may be reached, and the work of the North Commission with respect to this issue will be followed with much interest.

W. L. C.

Edgar Thomson Records in October.—All records for output of pig iron, ingots, blooms and rails at the Edgar Thomson Works of the Carnegie Steel Company were broken in October. The 11 Edgar Thomson blast furnaces made a total of 148,134 gross tons of pig iron, against 130,679 tons made in March this year, the best previous record. In October furnaces E, F, G and K made a total of 82,301 tons of pig iron, against 78,119 tons in March, the best previous record. Each of the above four furnaces averaged nearly 700 tons per day, and on some days the output of individual furnaces was much larger. The output of these four furnaces in October stands as a world's record, beating the four Duquesne furnaces' best record by a considerable tonnage. The output of ingots in the Edgar Thomson Works in October was 107,037 gross tons. The output of blooms was 92,560 gross tons, from which No. 1 rail mill rolled 61,048 tons of standard sections, No. 2 rail mill 23,547 tons of standard sections, while No. 3, the new light rail mill, made 5251 tons of light sections, or a total of 89,846 tons of rails. This is a world's record in the manufacture of rails for any one plant for a single month and will likely stand for a long time.

A New English Rail Mill.

The International Steel Rail Syndicate has a very important new outsider to deal with in the Cargo Fleet Iron Company, having the most modern of all English works. The report is current in England that the Cargo Fleet Company has made a contract with Argentine railroads for 100,000 tons of steel rails, with an option of 150,000 tons more, at £5 7s. 6d. per ton, or £1 below the syndicate price, which is £6 7s. 6d.

A complete description of the new works is published in the report of the tour of the members of the American Institute of Mining Engineers in England, just published by the Iron and Steel Institute. It may be noted incidentally that C. J. Bagley is the managing director, and that Benjamin Talbot, the inventor of the continuous open hearth process, is a very large stockholder and a very active technical member of the Board of Directors. We quote from the description as follows:

This company owns the Liverton mines, the Mickleton limestone quarries and the Cargo Fleet Iron Works, all of which have been in existence for a great many years. The whole of the combination has recently been remodeled, and large steel works and rolling mills have been erected. To bring the old plant into line with the new extensions considerable alterations had to be made in the layout of all the sidings, so as to deal efficiently with the increased and altered form of output and the greater diversity of raw material required for such output.

The Blast Furnace Plant.

The blast furnace plant consists of two furnaces, 90 ft. high, 11 ft. hearth and 21 ft. bosh, the blast being heated by 12 Cowper stoves. This plant has been remodeled from the older plant, which originally consisted of five smaller furnaces. Each of the present furnaces is capable of producing some 1200 to 1400 tons of pig iron per week, all of which is taken in a molten state to the Talbot plant for conversion into steel. Seven gas blowing engines of the Cockerill type, built by Richardsons, Westgarth & Co., Ltd., Middlesbrough, are installed. The engines are all single Otto cycle engines, delivering 14,000 cu. ft. of free air at 10 to 12 lb. per square inch. They are, however, capable of delivering against a pressure of 17 to 18 lb. per square inch when necessary. The gas cylinders are 51½ in. in diameter, blowing cylinders 59 in. in diameter by 55 in. stroke, and run at 70 to 80 rev. per min. Each of these engines can be separately connected to either furnace, three being required for each, and one remains as a stand-by. The engines are spanned by a three-motor 20-ton crane. The cooling water for the pistons and cylinder jackets is supplied from a tank to the engines, and is then pumped by two electrically driven turbine pumps to a Morrison cooling tower, and then pumped to the tank to be used over again. The gas washing plant consists of three Thelsen gas washers, two of which are capable of dealing with the gas from both furnaces. This amounts to 1800 c. m. per min. Each washer is driven at a speed of 310 rev. per min. by a 150 brake hp. Brown-Boveri motor. The gas enters the washer or fan at a temperature of 300 deg. to 500 deg. F., containing only 0.016 to suitable for going to the gas engines, and is also very much more efficient under the stoves and boilers. The quantity of water required by the washers varies from 1 to 2 liters per cubic meter of gas washed, depending upon the dust contents and the temperature of the ingoing gas.

The Furnace Equipment.

There are six Babcock and one Nesdrum water tube boilers for supplying steam to a 1000 hp. turbo generator and the necessary steam for the coke oven plant and engines on the Brown hoists. A gantry runs along the back of the furnaces, to which the trucks of ore, limestone, and coke are taken by an inclined electric hauling arrangement and emptied into the ore and coke bins where required, and then run to a balance drop hoist to the works level again. A long ore and coke bin is placed behind each furnace. These are divided into the necessary number of compartments for the various kinds of raw material. The ore, &c., is automatically taken from these bins

to a weighing machine and delivered into the skip. The materials are then taken to the top of the furnace and automatically tipped into the furnace by a Brown Hoisting Machinery Company's skip and bell arrangement, which secures very equal distribution of stock into the furnace and is operated by one man from the hoist engine-house below. Each furnace is fitted with Sahlin's patent bosh and bronze or copper tuyeres, making a very simple and effective cooling layout. A Vaughan gun is used for plugging the tap hole, and this is done while the blast is on the furnace. Only on very rare occasions has it been found necessary to take the blast off for closing the hole after casting. Two pyrometers of the Callendar type are fitted to each furnace, one for the blast temperature and one for the waste gases.

This furnace plant is designed for an output of 1400 tons per furnace per week, using Cleveland calcined ore and the necessary fluxes to produce basic pig iron suitable for the Talbot continuous process of making steel.

The Fuel Arrangements.

The coal washing plant consists of a Humboldt washery capable of dealing with 60 tons of coal per hour. The Humboldt concentric screen separates into six different sizes, five of which are treated on the jigs, and the sixth, in lumps too large to pass any screen, go to a breaker and then return to the washery. The washed coal is raised by a large elevator to a trough where by means of a right and left hand spiral conveyor it is delivered into two disintegrators, and the disintegrated coal passes to a Robins belt conveyor to the coke oven coal store.

The coke oven plant consists of 100 Kopper ovens, 50 at each side of the washed coal store. These are fed by two double box coal compressors of the Baroper type and travel under the coal store, where they receive the washed coal in a box the same size as the oven. The coal is compressed by means of stampers in a box, and the compressor, which is electrically driven, travels opposite each oven and pushes the cake of coal into the oven. After burning, the coke is ejected by a pusher, sprinkled with water on an inclined bench, and ultimately delivered into a coke car, which in turn delivers it into the coke bins for the blast furnaces, or into stock, as may be required. The gases from the ovens pass to the by-product plant, where sulphate of ammonia and tar are recovered. The amount of gas available for power purposes, after leaving this plant, is capable of developing 3000 hp. in gas engines.

The electric generating station comprises one compound steam direct driven set of 350 kw., one steam turbo generator of 750 kw., and two Premier gas engines, each directly connected to two 300-kw. generators. All the generators are of the Brown-Boveri make and run in parallel on a 220-volt continuous current circuit. The works load, distributed by one large switchboard, consisting of six panels, is of a very varying character, and from the description of the work it will be seen that the task of running all these various types of generators in parallel was no easy one.

The supply of iron ore for the blast furnaces is obtained from the company's Liverton mines, situated on the North Eastern Railway, near Loftus, about 20 miles from Cargo Fleet. The royalty extends over about 2500 acres and the seam of iron ore varies in thickness from about 9 ft. to a little over 6 ft. The mines have been worked for some time, but only with a small output, and it is calculated that the quantity of ore amounts to between 30,000,000 and 40,000,000 tons. The company's requirements for two blast furnaces are about 7000 tons per week, and the whole of the appliances at the mines have been remodeled to enable this output to be obtained by working only one shift of eight hours daily.

The Steel Plant.

The steel plant contains three 175-ton Talbot furnaces. The gas for working these furnaces is supplied by ten mechanically stirred Talbot producers. On the furnace platform is provided an electrically driven Wellman charging machine. Two 40-ton hot metal cranes are provided on the charging side and a 75-ton steel casting crane on the casting side of the furnace plant. One 150-ton gas fired mixer is installed, together with the neces-

sary crushing and grinding plants for manganese, pig and dolomite, &c. The Talbot furnaces are operated by gas reversing valves of the water sealed type and specially designed air valves and dampers, each Talbot furnace having a separate chimney stack. These furnaces have been built by Richardsons, Westgarth & Co., Limited, Middlesbrough. The producers are built in a row behind the steel plant and the coal is elevated from the railroad trucks to the bunker above by a Royce crab elevator. The coal from the bunker is mechanically fed and distributed into the producer. The poking gear is driven by two small steam engines. The blast for blowing these producers is delivered by four Samuelson blowers driven by steam. The exhaust steam from these engines is utilized for providing the necessary steam to be driven along with air to the producers. The gas produced by these producers amounts to 150,000 cu. ft. per ton of coal gasified. The operation of this plant is as follows:

The pig iron is run from the blast furnaces into hot metal ladles of 20 to 25 tons capacity and these ladles are conveyed on carriages to the melting shop, where the metal is poured into the metal mixer. Here a portion of the sulphur and silicon is eliminated and the metal from the mixer is poured into a 20-ton ladle, carried by a 40-ton crane, and transferred in a molten state to the steel furnaces. In starting up the steel furnaces at the beginning of the week 50 to 70 tons of steel scrap is charged by an electric charging machine in the ordinary way. When this is melted, along with the necessary reagents, metal from the mixer is added and the charge worked until the furnace contains 175 tons of steel of the desired quality. Fifty tons of this steel is poured into a ladle and carried by a 75-ton crane and cast into ingot molds of 3 to 5 tons capacity, which are carried on cars. The charge in the furnace is now 125 tons. This is over-oxidized by the addition of reagents, and another two ladles containing approximately 25 tons of iron are added, when a violent reaction takes place and in a very short time the bath is ready for another 50 tons to be drawn off. Thus it will be seen that the process is a continuous one. The ingots now cooling on the casting cars in the molds are taken by a locomotive to an ingot stripper. The yield of steel from every 100 tons of pig put in is 104 to 106 tons of steel ingots, the gain being obtained from iron in the reagents used. The yield of steel from ordinary open hearth basic furnaces amounts to from 92 to 94 tons for every 100 tons of pig and scrap charged. The slag from the Talbot steel furnaces contains from 15 to 19 per cent. of phosphoric anhydride, as compared with 10.5 to 12.5 in an ordinary open hearth basic plant. A basic slag works is being put down for treating slag from the Talbot furnaces for agricultural purposes.

The Rolling Mills.

Two rolling mills have been constructed—one for cogging (or blooming) and the other for finishing. The cogging plant consists of two gas fired soaking pits spanned by a 15-ton crane, which takes the ingots from the casting car to the soaking pits, and after heating removes them from the soaking pit to the mechanical chair, which in turn deposits the ingot on live roller gear conveying material to the mill. The mill itself is 40 in. center by 8 ft. 6 in. rolls, driven by three-cylinder compound condensing engines, 45 in. diameter, 52 in. stroke. All cylinders are the same size, there being one high pressure and two low. These engines were built by Richardsons, Westgarth & Co., Limited, Middlesbrough, and are provided with the Rottman valve gear, which enables them to be operated either as compound engines or as high pressure engines. The ingots after being clogged down to the required size are conveyed by the live roller gear, all of which is electrically driven, to the hydraulic bloom shears, where they are cut to the required lengths and transferred by a Collins charger into the two gas fired reheating furnaces to be reheated preparatory to finishing.

The finishing mill consists of four stands of rolls, driven directly by an engine similar to the cogging mill engine. The reheated bloom is brought from the reheating furnaces and deposited on a live roller table, which carries it forward to the first pair of rolls. The mill is

provided with two traveling tables, one on each side of the rolls. After leaving the finishing rolls the piece is carried forward by an extended roller rack to the hot saw or shears, as may be required. The finishing mill is spanned by a 60-ton crane, so arranged that for roll changing the housings and rolls are lifted bodily out and the new set of rolls put in. Beyond the finishing mill is a hot bank, 52 x 100 ft. After the material has crossed the hot bank it is conveyed by live roller gear through straightening presses to the shears.*

The boiler plant provided for supplying steam to these mills consists of 10 Nesdrum and 2 Lancashire boilers, the boilers being provided with coal fired grates and also gas burners for utilizing the gas left over from the blast furnaces, which it is anticipated will produce one-third of the steam required. All the boilers are equipped with induced draft and provided with economizers. The condensing plant put down is of the Weiss type, capable of dealing with the steam from three mill engines of the size already indicated, and the necessary hydraulic, circulating and boiler feed pumps. The pump house is equipped with electrically driven circulating pumps, steam driven dry air pumps, condenser water pumps, steam driven hydraulic pumps and boiler feed pumps.

Economy of Motor Delivery Wagons.

Four single-horse express delivery wagons were recently removed from service, says the *Electric Journal*, and an electric wagon substituted; it was afterward found necessary to reinstall one of the horse wagons to take care of momentary requirements while the electric was engaged in routine delivery. Careful account was kept of the costs of operation under the two systems, the electric being contrasted with the three vehicles which it ultimately replaced. In investment cost the three wagons are rated at \$175 each and four horses (one spare horse) at \$160 each, a total "rolling stock" charge of \$1,165. The electric wagon stands on the books at \$1,925, made up of batteries, \$625; motors, \$300; wagon body and remainder of equipment, \$1,000. In the matter of running expenses, interest at 6 per cent. on the investment figures out, for the three wagon equipment, \$70; 10 per cent. depreciation of wagons and \$35 repairs to each make \$157; 20 per cent. depreciation on the horses comes to \$128; feed, shoeing, care and stable expenses at \$28.75 per month, and harness, blankets, &c., at \$3 per month for each horse, make an annual total of \$1,524. The three men, at \$45 per month each, account for \$1,620 per annum, a total running expense of \$3,499. With the electric outfit the interest is \$116; current charges and battery renewals at the rate of two sets of positives and one of negatives per annum, \$400; 5 per cent. depreciation of motor and 10 per cent. of balance of wagon make \$115; mechanical repairs at \$9 per month, \$108; one man at \$60 and one at \$45 per month, \$1,260; total, \$1,999. Saving over horse outfit, \$1,500 per annum. This saving is seen to be nearly equal in one year to the entire cost of the electric outfit, and to be \$740 greater than the difference in cost between horse and electric equipments. In other words, if the service were to be started afresh, the entire cost of the first year, including both original investment and all running expenses, shows a difference of \$740 in favor of the electric system of operation. This was a case where the comparison was made from the point of view of actual, hard and continuous service, and the figures are well worthy of careful study.

Catalogues are desired on machinery, foundry work, engines, railroad work and electricity for the trade catalogue collection of the Providence Public Library, Providence, R. I., which is extensively used by the public.

Seattle, Wash., is arranging to hold an exposition in 1909. Its purpose will be to promote Oriental trade. It will therefore be international so far as Oriental countries are concerned.

* It is this mill which has been planned and is now being equipped to roll steel rails.—THE EDITOR.

The National Tube Company's McKeesport Extensions.

The recent announcement that the Finance Committee of the United States Steel Corporation has authorized the building of a fourth blast furnace at the National Department of the National Tube Company at McKeesport, Pa., for which ground has already been broken, gives additional interest to the large extensions and improvements that have been under way at this plant for more than a year, and which have cost upward of \$5,000,000. We have been favored with an official statement regarding these matters and are thus enabled to present the following information:

General Improvements.

Since January 1 there has been installed and put in operation a third blast furnace with a daily output of 450 to 500 tons, while ground has been broken for the new furnace, 20 x 85 ft., and of the same capacity. There has also been built a new slabbing mill on which all four sides of the ingot may be worked at once, and which is equipped with the largest motor driven shear ever built. There has further been installed a 30,000,000 gal. pumping station of the most modern type, consisting of three triple expansion condensing pumps, handling water through an elaborate settling basin system and distributing from a high tower through 36 in. mains for a distance of over a mile, to all parts of the old and new plant. Other installations comprise a metal mixer; an additional converter and equipment so as practically to double the output of the old Bessemer steel works installation; an ore bridge and new bins and arrangements for a car dumper, by which ore, coke, and limestone at the furnaces will be handled in the most modern way. New steeple type blowing engines are in operation; new approaches, trestles and track connections, so that everything at this end of the plant may be handled in the most economical manner. Between the furnace plant and the new rolling mill are, very nearly completed, the turntable, roundhouse, and locomotive and car repair shop, where locomotives can be housed when not in service, and locomotives and cars can be kept in repair. During the year the ground occupied by the old Bowery district has been completely covered by modern steel and brick buildings, crane runways, overhead track system shops, &c.

Improved Mill and Yard Equipment.

In the new plate mill, which has been in operation since January, the slabs are taken directly from the cars by electric charging machines, heated, delivered to the mill, rolled, passed through the straightening machine, across the cooling beds, and delivered to the shear entirely by the use of machinery, and after being trimmed are loaded on cars by electric cranes for shipment to the tube and pipe mills. The other rolling mills in course of construction, and which will be put in operation one at a time as completed, are all of the most modern type. Long crane runways have already been installed, which are now being used for shipping and stocking pipe, but which will eventually have stored under them the stock piles of slabs and finished skelp.

The coal hoist and crushing plant, where coal is to be lifted from the river or cars, is deserving of special notice. This plant is already in operation, and designed to handle 2000 tons of coal in 10 hours. By this arrangement coal is lifted from the river or cars, passes through crushers and over screens, where it is divided into nut and slack, and from this point, by an overhead system and by means of small coal cars, drawn by electric locomotive, is distributed to all parts of the plant and deposited through drop bottoms into bins, from which, by spouts, it is led to the boilers, producers and furnaces. And in this same connection, below ground are corresponding ash tunnels where the ashes are collected in small cars, drawn again by electric locomotives to central points, where the ashes are raised into bins, from which they are deposited into road cars for shipment.

The shops of this department are grouped along a crane runway which is connected with a cross crane run-

way, so that rolls, machinery, spares, &c., may be carried from any part of the entire rolling mill plant and deposited in the shops without the use of a locomotive, car or hand truck, and along the same crane runway hot steel may be transferred from one group of heating furnaces to any one of the sets of mills.

Water Purifying System.

In the center of the rolling mill plant and in close proximity to the new boilers, is the new water purifying system, by which the highly acid and scale forming river water is so treated that it becomes harmless in the corrosion or scaling of pipes and boilers. This water after being treated is delivered from a standpipe to all parts of the plant, including the blast furnaces, steel works, rolling mill and tube and pipe mills, where it is made use of in boilers, hydraulic systems, &c.

The engines of the new rolling mill are all of the most modern type, being compound condensing engines of the heaviest rolling mill construction, and in many cases they drive several stands of rolls by the use of modern rope drive construction.

The Electric Power Plant.

Between the new rolling mill and the proposed new tube and pipe mills is located the new electric power house, containing four 600 kw. direct current generators, each directly connected to a 1000-hp. cross compound steam engine. These generators now supply current for the entire plant and for the Wood plant of the American Sheet & Tin Plate Company. Two additional units are being added, each consisting of a 1000-kw. generator directly connected to a gas engine of 1700 hp., which will be supplied with furnace gas brought from the blast furnaces and led through suitable cleaning and washing apparatus. Adjoining the electric power house is the electric repair shop, where nearly all of the electric cranes now in use in the plant have been designed and constructed.

The Largest Mill Building in the World.

The ground where the old plate mill stood is being cleared, and in a short time the tube and pipe mill department will begin the erection of what it is said, will be the largest mill building in the world, covering more than 20 acres of floor space, nearly every square foot of which will be served by an overhead electric traveling crane. This building, or series of buildings forming one, will be constructed of steel and brick, and will extend without a break in the roof covering, and will be 567 ft. wide. One portion, nearly a third of a mile long, will be covered by roof trusses spanning 158 ft. and at their centers carrying crane runways for 15-ton traveling cranes. The pipe welding furnaces and machinery for the production of sizes from 1/4 in. to 36 in. diameter will be located in this portion of the building, while the balance of the space will be used for cooling tables, finishing and testing equipment and for stocking.

The skelp will be handled directly from cars, and this operation, together with successive ones of charging, scarfing, bending, welding, sizing, straightening, cooling, stocking and shipping, will be accomplished by the use of the most modern machinery and labor saving devices, all operated by electric motors deriving their power from the central electric power house above described. Large areas have been reserved for stocking pipe of all sizes under cover.

Looking After the Comfort of Workmen.

In the pipe mills, as elsewhere in the plant, arrangements are being made to minimize the exposure of workmen to heat and danger by placing the controlling levers and devices as far as possible from hot and dangerous machinery. Great attention has been given to the question of light and ventilation. The best possible arrangement for lighting the large building has been aimed at and entirely satisfactory results are expected. Fresh air will be taken from outside the building and blown directly on the men exposed to great heat, and large heating and ventilating systems will be installed for those parts of the building remote from the hot furnaces and pipe, so that it is expected that at all times as pure air and as comfortable a temperature will be maintained as is possible in so large a structure.

The Shops.

Between the pipe mills and the west end of the company's property will be located the main shops, consisting of iron and brass foundries, boiler shop, blacksmith shop, couplings shop, machine shop, pattern shop and pattern storage. The pattern shop and the pattern storage building, which occupy a portion of the machine shop building, are practically completed and are in use. The pattern storage department occupies three upper floors of a four-story portion of the building, which is of steel, with brick curtain walls and reinforced concrete floors. The pattern storage floors have no windows nor other openings whatever inside of the walls, the only access to these floors being by means of an outside elevator carried on a skeleton steel frame fastened to the steel frame of the building. Each floor is provided with a fireproof door, and the electric light switch is placed in a recess in the brick wall outside the door. A special pipe line for fire purposes only runs along the elevator structure, and at each floor is placed a reel of hose ready for instant use in case of fire. These precautions seem adequate to protect the valuable patterns of the company from damage by fire. The shops will be connected with each other and with the different mills and the electric repair shops by means of an overhead trolley or telfer, which will be able to travel without interference and convey machinery or materials not aggregating more than 4000 lb. from any department to any other department, necessitating but one operator. Particular attention is directed in an effort to secure thorough sanitary equipment throughout the plant for all employees.

According to the new plans the three railroads reaching the property will each be given additional connections by which both incoming and outgoing freight may be easily handled to and from the plant. Below River-ton the Pennsylvania Railroad will construct its new freight yards on the ground now occupied by the Boston mill, and inside the fence, which will run around the entire property, will be large yards for receiving and delivering freight from the different roads. To handle the work better in the McKeesport mills it has been deemed advisable to separate the specialists of job shop, trolley pole shop, &c., from the regular product, so that large additions have already been made to the galvanizing plant at Versailles, and some departments are in operation, where all of this special work will be handled in the most modern way by electric traveling cranes and shipped and stored in buildings and yards in the same manner. To make room for these extensions the office building at Versailles has been moved to a new location, made nearly double its former size and completely remodeled and renovated.

October Output of the Tennessee Company.—The Tennessee Coal, Iron & Railroad Company, in spite of the floods in October, which interfered greatly with the operation of its limestone quarries, produced 60,854 tons of pig iron. This is about 3000 tons greater than the production in October, 1905. The high month's record in the history of the company was 60,350 tons, made by 16 furnaces when the company was operating the three Sheffield, Ala., furnaces, afterward sold to the Sheffield Coal & Iron Company, and the two furnaces at South Pittsburgh, Tenn., now also active. The total for last month represents the product of 11 furnaces. October showed gains over September not only in pig iron, but in ingots, as well as in output at the various mineral properties of the company. Coal production was increased 33,000 tons over September.

The Association of American Portland Cement Manufacturers will hold its fourth annual meeting at the Hotel Astor, New York City, December 11 and 12. It is anticipated that this meeting will be the largest held since the organization of the association. Many interesting and important subjects will be presented for discussion. The headquarters of the association are in the Land Title Building, Philadelphia.

Customs Decisions.**Steel Engraving Plates.**

The Board of General Appraisers October 31 denied claims filed by William B. Sellers relative to the customs classification of steel plates intended to be engraved and used in the printing of steel engravings and so-called monogram dies, small plates on which monograms are to be engraved. The merchandise was assessed for duty at the rate of 45 per cent. as manufactures of metal. Several claims for lower duty are made by Mr. Sellers, but the board overrules the contentions on the ground that the correct claims are not made. The collector's assessment is also held to be erroneous. According to the board the proper assessment should have been under paragraph 135, with the addition of 1 cent per pound on account of the character of the finish of the articles.

Mica for Commutators.

In a decision promulgated by the Board of United States General Appraisers October 31, claims made by the Westinghouse Electric & Mfg. Company for lower duty on importations of mica plate used in commutator work were overruled. The customs authorities assessed duty on the merchandise at the rate of 12 cents per lb. and 20 per cent. ad valorem under the provision in the tariff law for cut or trimmed mica. The importing company alleged that the merchandise should be considered as nonenumerated manufactured articles with a 20 per cent. duty. Another claim was that the mica comes within the tariff provision for earthy and mineral substances not specially provided for with a tax of 35 per cent. General Appraiser Fischer, who writes the decision for the customs tribunal, says in part: "We are unable to understand how the imported article can be differentiated from any ordinary mica, for the mere pasting together of a number of small sheets to make larger sheets did not change its character or name; it still remains mica, and having been cut square it is undoubtedly cut mica."

Wooden Reels for Holding Wire.

The American Steel & Wire Company has decided to make a test case involving the classification of wooden reels intended for holding wire. The reels are imported from Canada in a knocked-down condition, although they are so far finished that slight labor is required to set them up. In the test case now pending before the Board of United States General Appraisers the importers claim that the merchandise should be admitted into this country under the provision in the tariff for unmanufactured wood, with assessment at the rate of 20 per cent. On the other hand, the Government insists that as the reels are imported in parts ready for putting together the articles shall be deemed manufactures of wood within the meaning of that term as used in the law. Under the Government's contention the duty is 35 per cent. A hearing has been granted in the matter. The same company is also involved in a dispute with the customs authorities regarding the prices at which imported reel stock may be invoiced. It has been decided by subboard No. 2 that the merchandise will have to be entered at higher values.

Foreign Advertising Pamphlets.

The Board of Appraisers has promulgated a decision which is of interest to importers of advertising pamphlets printed in foreign languages and inclosed in addressed envelopes to persons in foreign countries ready for mailing in this country. The test case came before the reviewing tribunal in the form of a protest by a firm of customs forwarders representing the actual importers. When the importation reached New York the Treasury officials admitted the pamphlets free of duty, but taxed the envelopes at the rate of 20 per cent. under the provision in the tariff for such articles. The protest maintained that the envelopes should also be admitted free under the provision for pamphlets, the understanding being that the envelopes should be considered the usual coverings for the booklets. General Appraiser Fischer, in his decision written for the board, overrules the importer's protest.

NEWS OF THE WORKS.

Iron and Steel.

William Swindell & Brothers, engineers and contractors, Pittsburgh, have recently completed the following contracts: Eight large Swindell regenerative heating furnaces for the Schoen Steel Wheel Company, McKees Rocks, Pa.; one regenerative heating and one annealing furnace, Slinger Mfg. Company, Elizabethport, N. J.; one regenerative annealing furnace, Lorain Steel Company, Johnstown, Pa.; one 30-pot crucible steel melting furnace, Columbia Tool Steel Company, Chicago Heights, Ill.; one 40-ton melting furnace, Farrel Foundry & Machine Company, Ansonia, Conn.; malleable plant, including melting and annealing furnaces, Amherst Malleable Iron Company, Amherst, Nova Scotia; two Swindell annealing furnaces, Superior Steel Company, Carnegie, Pa.; gas producer plant, Crucible Steel Company of America, Spaulding-Jennings Works, Jersey City, N. J.; entire furnace equipment, Firth-Sterling Steel Company, Uniontown, D. C., including open hearth melting furnace, regenerative heating furnaces, annealers, treating furnaces and gas plant. William Swindell & Brothers are further about to commence work on the following contracts, all material for which has been purchased and delivered: Two 25-ton basic open hearth furnaces and one regenerative heating furnace, West Leechburg Steel Company, West Leechburg, Pa.; one 10-ton open hearth furnace, Ft. Pitt Malleable Iron Company, McKees Rocks, Pa.; one 20-ton open hearth furnace with gas producers, Crucible Steel Company of America, Harrison, N. J.; two 30-pot crucible steel melting furnaces and gas plant, Ludlum Steel & Spring Company, Watervliet, N. Y.; an extension to the gas producer plant of the Alan Wood Iron & Steel Company, Ivy Rock, Pa.

The Youngstown Sheet & Tube Company is installing in its Bessemer steel plant at East Youngstown, Ohio, four more new cranes which are expected to be completed January 1. As soon as these cranes are ready No. 4 cupola in the converting plant will be started, which will allow a considerably larger tonnage of Bessemer steel to be turned out. It is expected that within two or three months this plant will be turning out about 1500 tons of Bessemer steel per day, about half of which will go into billets and the rest into sheet and tin bars.

The Berger Mfg. Company, Canton, Ohio, which is preparing to move to that city the rolling mill plant recently purchased at Waukesha, Wis., has its new buildings well under way. The main shop measures about 100 x 500 ft. The Sleeper Engineering Company, Pittsburgh, Pa., is engineer for the new work.

The High Speed Steel Company has been incorporated with a capital stock of \$1,000,000, by Joseph Kahrs, an attorney of Newark, N. J., and others.

The court has directed the sale of the plants of the Susquehanna Iron & Steel Company at Columbia, Pa., on December 1. The sale will be subject to a mortgage of \$300,000 and no bid will be entertained that is not \$400,000 in excess of the mortgage indebtedness.

The newly remodeled 16-in. mill at the lower plant of the Carnegie Steel Company, Youngstown, Ohio, will soon be ready for operation. Two Belgian furnaces have been built. An electric conveyor will carry the heated billets from the furnaces to the rolls. Other improvements have been added which will greatly increase the tonnage.

Atlantic Furnace of the Republic Iron & Steel Company has been idle for some time undergoing extensive repairs. Four new stoves have been added to this furnace, built from designs of the Republic Company, also a new blowing engine furnished by the William Tod Company, Youngstown, Ohio, and a Weiss condenser furnished by the Southwark Foundry & Machine Company, Philadelphia. Hall Furnace of the Republic Company, at Sharon, Pa., is being relined and repaired and a new shell is being added. This furnace was in blast continuously since 1901 until a few months ago, when it was blown in for repairs, and made a very creditable record. Both these stacks are expected to be in blast before January 1. By that time the company will be making upward of 2200 tons of Bessemer iron per day at its blast furnaces in the two valleys, or nearly enough to supply its entire requirements for the Bessemer steel plant at Youngstown.

General Machinery.

The American Roll & Foundry Company, Canton, Ohio, recently formed in that city by James B. Baird, Edward Langanbach, David B. Day, William Groudy and others, is pushing work on its new foundry and machine shop. The Garrett-Cromwell Engineering Company, Cleveland, is engineer for the plant, which includes a main foundry building, 60 x 160 ft.; machine shop, 60 x 140 ft.; power house, 38 x 50 ft. The foundry department equipment will include a 15 and 25-ton Morgan Engineering Company's crane, two 18-ton air furnaces, one 35-ton cupola, Sturtevant motor driven blower and two furnaces served by 10-ton jib cranes. The machine shop will have a 25-ton traveling crane, a dozen lathes of various sizes, vertical boring mill, several large drills, key seater, triple geared shaper, centering machine, bolt cutters, milling machines, universal grinders, &c. Practically all of the equipment is under contract and it is hoped to have the plant in operation by the first

of the year. Next year it is stated that a steel foundry will be added and the other departments enlarged.

The Knight Mfg. Company, Canton, Ohio, builder of sawmill machinery, had a representative in Cleveland last week trying to buy about \$15,000 worth of automatic screw machines, lathes, drill presses, &c. It wanted immediate delivery and offered premium for early shipment, but did not succeed in getting all the tools it wanted.

The De Lux Motor Car Company, Detroit, Mich., has been buying about \$15,000 worth of milling machines, drill presses, turret lathes and other tools from Cleveland dealers and manufacturers. This company was formerly located in Toledo and is now erecting a large plant in Detroit.

The Cleveland Automatic Machinery Company, Cleveland, Ohio, is erecting two good sized additions to its plant and is rearranging its entire equipment to provide for increased manufacturing space. It is buying about \$25,000 worth of new machinery, including lathes, planers, boring mills and other tools of high speed type. The company is 10 to 12 months behind orders on its automatic machinery. The demand is general for all sizes of automatics from $\frac{1}{8}$ in. up to 6 in., with a particularly heavy demand for $\frac{1}{4}$ -in. automatics. The automobile trade is furnishing it with a very large number of orders. The foreign trade never was better, Germany, France and Italy being especially strong at present, and, as in this country, a large percentage of these orders are from automobile makers.

The Ajax Mfg. Company reports an unprecedented demand for heavy forging and bulldozing machines, especially for railroad work. It is building some very heavy tools of these varieties for the Philadelphia & Reading, Pennsylvania and Southern railroads and the American Locomotive Works.

The American Clay Working Machinery Company, Willoughby and Bucyrus, Ohio, has been adding to the equipment of its plants in both places and has been buying new tools in the Cleveland market. It has just put in a 10-ft. boring mill at Bucyrus and is moving a similar tool from another plant to Willoughby. A large factory addition is being erected at Bucyrus.

The Tolhurst Machine Works, Troy, N. Y., has incorporated with a capital stock of \$50,000 to take over the plant and business of W. H. Tolhurst & Son, who manufacture hydro extractors and other machinery. W. H. Tolhurst is president; A. G. Goldthwait, vice-president, and C. H. Foster, secretary and treasurer.

The A. H. Reid Creamery & Dairy Supply Company, Philadelphia, Pa., has decided not to build a new plant at Holmes and will locate its factory in a large building at Sixty-ninth and Haverford streets, Philadelphia, where it has ample space to extend as the business requires.

The Ladewig & Stock Company, manufacturer of machinery, has been incorporated at Waukesha, Wis., by William E. Ladewig, Harry E. Stock and Charles W. Newbury. The capital stock is \$25,000.

The Smith & Post Company has been incorporated at Milwaukee, Wis., with a capital stock of \$100,000, and Thos. L. Smith, Paul W. Post and Edgar B. Symons as incorporators. The company is already occupying the building formerly occupied by the Mechanical Appliance Company, on Hanover street, for the manufacture of tools. The business is to be very materially increased within a few months for the manufacture of a line of special patented machinery.

The Calumet Engineering Works, Harvey, Ill., is the new style of what has been known as the Harvey Foundry & Machine Company. Following the reorganization the capital stock has been increased from \$25,000 to \$250,000 and the number of directors increased from three to five.

The repair shops of the Lake Shore Electric Railway, at Fremont, Ohio, which were badly damaged by fire two weeks ago, are being rebuilt in a temporary manner. The company is preparing plans for a very complete shop to take care of the work of the entire system. It will probably be located near Fremont. In the recent fire the company lost nearly all of its machinery, including two large wheel turning lathes, wheel press, engine lathe, nut and bolt machine, planers, shapers and other miscellaneous tools. A very complete shop equipment will be purchased for the new shop.

The Case Mfg. Company, Columbus, Ohio, is erecting an addition, 80 x 140 ft., for its crane erecting shop. The building will be of brick and steel construction and in it will be installed a heating plant for heating the entire factory; also a 10-ton crane for erecting purposes.

The J. D. Fate Company, Plymouth, Ohio, manufacturer of clay working machinery, brick and tile machines, is erecting a new addition, 47 x 80 ft., two stories high. The company is erecting one of the largest brick making machines ever constructed for a company at Montreal, Canada. The machine weighs 30,000 pounds and has a capacity of from 150,000 to 200,000 bricks per day. The company has recently shipped machines to New Zealand, Austria and all parts of the United States and Canada.

The Elmira Saw & Machine Company, Elmira, N. Y., increased its capital stock and intends to improve its machinery

equipment to facilitate the turning out of its products. The company will handle both new and second-hand machinery, do all kinds of repair work and manufacture circular saws.

The Judge Mfg. Company, Buffalo, N. Y., has incorporated with a capital of \$10,000, to manufacture machinery and factory supplies. Jno. R. Judge is president and manager.

A contract has been concluded between the Rushville Improvement Association and C. E. Francis & Bros. of Cincinnati, Ohio, by which the latter will locate a woodworking machinery plant at Rushville, Ind., the company getting a free site and \$5000 cash bonus.

Power Plant Equipment.

James F. Morrison, Allegheny, Pa., has received a contract for the installation of two two-flue boilers for the Board of Homestead, Pa., and also two two-flue boilers at the plant of the Lockhart Iron & Steel Company, McKees Rocks, Pa.

Paul & Henry, Barberton, Ohio, are preparing to erect an ice plant to have a capacity of 15 tons, which will later be increased to 30 tons. Two buildings will be constructed, one 40 x 80 and the other 40 x 60 ft.

The Lima Gas Engine Company, Lima, Ohio, has been re-organized as the Lima Engine & Mfg. Company. In addition to the manufacture of gas engines the company will build portable sawmills. The company is contemplating the erection of a large factory addition within the next year.

The Allis-Chalmers Company, Milwaukee, Wis., has received an order from the Lackawanna Light Company, Scranton, Pa., for a 1000-hp. Reynolds-Corliss engine, direct connected to generator.

The Watertown Engine Company, Watertown, N. Y., recently incorporated, will take over the plant of the Watertown Steam Engine Company and continue its operation.

Samuel W. Hay's Sons, Farmers' Bank Building, Pittsburgh, recently secured contracts to furnish the Wehrle Company, Newark, Ohio, with a 5-ton electric crane; Bonnot Company, Canton, Ohio, with a 10-ton traveler and a Dake pneumatic chain hoist of 5 tons capacity; Blair & Gazzam, Pittsburgh, with a 6-ton traveler; Duquesne Steel Works of the Carnegie Steel Company with 20 transfer cars of 3 tons capacity and two 25-hp. gas engines to the Pittsburgh Automatic Machine Company, Ellwood City, Pa.

The Standard Steel Car Company, Pittsburgh, which is to build a large steel car plant at Hammond, Ind., has ordered two 1500-hp. Westinghouse-Parsons steam turbines for this new plant.

John W. Landis, Pittsburgh, representative of the McNell Boiler Company, Akron, Ohio, has sold to the Loucks Iron & Steel Company, Roanoke, Va., two 250-hp. gas fired Cook water tube boilers.

The Enterprise Boiler Company, whose plant at Youngstown, Ohio, was burned some months ago, is understood to have sold its entire business to some Illinois capitalists, who will rebuild the plant at Youngstown on a larger scale than before.

Foundries.

The Ball Engine Company, Erie, Pa., manufacturer of automatic cut off engines, is building a new foundry, to be 150 x 190 ft., of steel, brick and concrete construction, and which will be electrically equipped. This company built two years ago a large new machine shop, and during the last year has built a large pattern storage building, pattern shop and office building. The new foundry now under way is the completion of a new plant which has been erected on a new site.

The Empire Foundry Company, Syracuse, N. Y., is negotiating for a site for a new plant. Plans are being prepared for a building 80 ft. long, work on which is expected to start this fall.

The John Pirkl Foundry Company, recently incorporated, has taken over the plant formerly occupied by the Astoria Steel Works, Astoria, L. I., which it will operate for the manufacture of iron, brass and bronze castings. The building is 220 x 260 ft. and is located on the Harlem River, having 80 ft. of water front. John Pirkl is president; W. Mansen, vice-president; James S. Bennett, secretary, and G. L. Schnepf, treasurer.

The Clough Mfg. Company, manufacturer of molded stove plates and trimmings, has outgrown its present factory and has completed plans for a large new plant. It is considering propositions from Warren and several other neighboring cities, but may decide to remain in Cleveland. The matter will be decided at an early date. Milton Coomes is secretary and general manager of the company.

The La Valley Foundries Company, Milwaukee, Wis., has begun work on the construction of its new plant, which will include the following buildings: Foundry, 70 x 160 ft.; carpenter shop, 44 x 56 ft.; power house, 24 x 24 ft.; office, 16 x 30 ft.; pattern storage vault, 30 x 50 ft., and several coke and sand bins. The walls of the foundry will be of concrete, with the upper part of frame construction. The other buildings will be of brick. Work on the plant will be rushed, and it is expected to have it in operation by the first of the year. The company will manufacture steel castings.

The Contractors' Castings & Machine Company, recently in-

corporated at Buffalo, N. Y., with a capital of \$50,000, has purchased a factory site of 5 acres on the Erie tracks at Hertel avenue, and will erect a foundry and machine shop costing about \$25,000.

F. Felkel, consulting engineer, Pittsburgh, is building a steel casting plant for the National Foundry Company at Erie, Pa. The building consists of a double span under one roof, 122 x 330 ft. The structure is of special design, incorporating new features by Mr. Felkel, who is also at work on an extension for the Union Iron Works Company, Erie. The building is two spans, 51 ft., with two crane runways.

Bridges and Buildings.

The current reports of a disastrous fire at the girder shop of the Virginia Bridge & Iron Company, at Burlington, N. C., were very much exaggerated. The fire caused but little loss and the plant is now in full operation.

A. W. Moore & Co., Indianapolis, Ind., secured the contract from the county for a bridge over White River near Broad Ripple, a suburb. The company's bid was \$28,381.

Fires.

The Avoca Wheel Works, at Bath, N. Y., were destroyed by fire November 4. The loss is placed at \$25,000.

The car shops of the Toronto, Hamilton & Buffalo Railroad at Hamilton, Ont., were burned November 1, with a loss of \$10,000.

The plant of the United States Oil Extracting Machinery Company, at Decatur, Ill., was damaged \$10,000 by fire last week.

The incinerating plant of the Penn Reducing Company, Philadelphia, Pa., was burned October 31. The loss is estimated at \$200,000.

The piano factory of Jacob Bros., New York, was destroyed by fire last week.

The plant of the Carnegie Plow & Mfg. Company at Carnegie, Pa., consisting of a foundry, machine shop, carpenter shop and blacksmith shop, boiler and engine house, was completely destroyed by fire November 2. This is the second time this plant has been burned down, and it will probably be rebuilt on a larger scale and considerable new equipment added.

Hardware.

Kitselman Brothers, manufacturers of woven wire fence, ornamental fence and gates and plain and coiled spring wire, Muncie, Ind., has in course of erection two separate additions. One of them is 50 x 75 ft. and the other 100 ft. square. Both of them will be of steel construction throughout and the machinery installed will be of the company's own manufacture. Electric motors will be used for power.

The Hoopeston Horse Nail Company, Hoopeston, Ill., has found its income of orders so great as to make it necessary to enlarge the plant at once to fill orders even now on hand. Special machinery is being built by the Henry Perkins Company, Bridgewater, Mass., and will be installed personally by Eben Perkins, the patentee. This equipment will be ready about January 1. It will also be necessary to increase the power plant, as well as to add to the machine and tool department. As published in *The Iron Age* some months ago, the Hoopeston Horse Nail Company purchased the Perkins cold process patents for manufacturing horse nails and installed a plant, replacing its hot forged machinery. The resultant success both as to quality of goods produced and economy in production is reported by the company to have been greater than was anticipated. The company also instituted a plan, new in its application to the horse nail business, of placing in each 5-lb. box of nails a coupon entitling the consumer to free selection of a large list of premiums. The Canadian patents of the Perkins process have been sold to the Montreal Rolling Mills Company, Montreal, Quebec, which lately completed a new plant for manufacturing cold process horse nails.

The Rockford Hand Vise Company, Rockford, Ill., has been incorporated by Frank Van Cauwenbergh, J. A. Holmes and H. B. Andrews. The capital stock is \$5000. The hand vise which will be manufactured is the invention of Mr. Van Cauwenbergh. One of its special features is that when the vise is set for holding a special device in the shape of an easy working lever sets the instrument so as to give an extra tight clinch.

The Clipper Lawn Mower Company, Dixon, Ill., manufacturer of hand and pony mowers and modern gasoline engines from 2 to 8 hp., has recently completed a new plant, 40 x 150 ft., two stories high, with a finished basement. A warehouse is also to be erected, 30 x 95 ft., and the site, which is 700 ft. long and 60 ft. wide, provides ample room for future extensions. The company has enjoyed a constantly growing demand for its mower and provisions have been made for manufacturing 15,000 to supply the demand of the coming season.

Extensions and improvements to the plant of the Arcade Mfg. Company, Freeport, Ill., which will practically double the capacity, are now under way. The addition to the gray iron foundry is 65 x 200 ft. and the melting capacity will be in-

creased by the installation of a cupola having a capacity of 12 tons an hour. With the completion of this extension the foundry will be 500 ft. in length, and a trolley system will be installed for carrying the iron to the different floors. A new brass foundry, 60 x 80 ft., is under erection, which will be equipped with a furnace having 20 pots. The new machine shop is 40 x 120 ft. and three stories high and the equipment already purchased comprises 20 tools. A plating plant 35 x 100 ft. is also being added. The company, which manufactures light hardware, including coffee mills, screen doors, hinges, cork pullers, mop holders, lamp brackets, stove pipe dampers, kitchen utensils, as well as molding machines, is now adding a new and complete line of refrigerator trimmings, including locks and hinges.

The Wright Wire Company, Worcester, Mass., has established a large department for the manufacture of picture cord. The line will be complete, including tinned, gilt and brass cords, which will be supplied to the trade in the standard sizes, lengths and packages. The department occupies a new factory located at its works in Palmer, Mass.

The Burnham Specialty Company has been organized at Waterbury, Conn., to manufacture household specialties. The first article to be made is a new style of mop wringer. The factory will be located in Waterbury.

The Coates Clipper Mfg. Company, Worcester, Mass., has begun the manufacture of a line of small carborundum wheels for use with the various grinding appliances manufactured by the company.

Geo. E. Gay, Augusta, Maine, manufacturer of Gay's ratchet screw drivers, owing to the increased demand for his products has materially enlarged his plant. He is now in better position than ever before to meet the requirements of the trade.

The plant and business of the Hays-Henderson Saw & Supply Company, Chattanooga, Tenn., has been purchased by other parties, who will be known as the Eagle Saw Works.

The National Sweeper Company now has its own foundry and complete departments for the manufacture of carpet sweepers at Newark, N. J. A portion of the company's factory at Marion, Ind., was destroyed by fire in April last. The wood-working department, however, was uninjured. As a result the boxes for the sweepers and all wooden parts are made at Marion and subsequently shipped to Newark in the white, and the balance of the manufacturing done at the new plant.

The E. A. Pflueger Company, Akron, Ohio, recently organized to manufacture fishing tackle, has purchased the plant of the Faultless Rubber Company and is now equipping it. The plant will be ready for operation about January 1. The main building is four stories in height, 60 x 150 ft., and has two annexes. The company is headed by Ernest F. Pflueger, formerly secretary and treasurer of the Enterprise Mfg. Company of Akron.

The National Hardware Mfg. Company, Cleveland, Ohio, which two years ago commenced work on a large hardware manufacturing plant at Port Clinton, Ohio, is said to have arranged for the refinancing of the project. The completion of the plant on original plans is now said to be sure and work is to start immediately.

Miscellaneous.

The Electric Storage Battery Company, Philadelphia, has opened offices in the Frick Building Annex, Pittsburgh, in charge of John A. White, formerly of Chicago.

The Waterville Corporation has been organized at Waterbury, Conn., to take over the extensive real estate holdings represented in the ownership of the Chase Rolling Mill Company. The capital stock is nominal, \$5000. Whether it will be increased and an active manufacturing business done by the corporation, or whether it will be a holding company only, is not announced, definite plans not having been formed. The incorporators are H. S. Chase, A. R. Kimball, Irving H. Chase and F. S. Chase, all of Waterbury, and R. J. Ashworth, Watertown, Conn.

The Williams Motor Carriage Company, formerly of Akron, Ohio, has acquired the plant and business of the Blakeslee Motor Vehicle Company, Cleveland. The company has been reorganized under Ohio laws with \$300,000 capital stock and with J. F. Townsend, president; Geo. Byreder, vice-president; C. C. Collins, secretary; E. G. Evans, treasurer, and H. A. Williams, general manager. The Blakeslee factory on Willson avenue is to be enlarged for the manufacture of electric pleasure and commercial vehicles, and plans are being prepared for a large factory for the manufacture of gasoline delivery wagons and trucks. A feature will be made of heavy trucks fitted with loading cranes. It has not been fully decided whether this factory will be located in Cleveland or some neighboring city. Several propositions from nearby towns are under consideration.

The Mechanical Rubber Company, Cleveland, Ohio, is getting out plans for a large addition to its mechanical rubber goods plant at the corner of the Cleveland & Pittsburgh and Nickel Plate railroads. Considerable heavy machinery will be installed. Richard Fogarty is master mechanic in charge of the work.

The Osborn Engineering Company, Cleveland, Ohio, is in charge of the erection of a large four-story concrete building for the Goodrich Rubber Company, Akron. It will install considerable new machinery.

The Craig-Toledo Motor Company, Toledo, Ohio, has succeeded to the business of the Maumee Motor Car Works of Dundee, Mich. The headquarters will be in Toledo, but the factory will remain at Dundee. The plant will be enlarged to manufacture 100 vehicles of the large gasoline type. F. J. Zahm is president; A. W. Colter, treasurer, and W. K. Perry, secretary.

On December 15 the Pittsburgh Paint & Supply Company will open offices and storeroom at 617 Liberty avenue, Pittsburgh.

There is no truth in the report that Henry A. Hitner's Sons, Philadelphia, Pa., are to build a plant at Eddystone. The firm has purchased 25 acres of ground, with wharf front and siding facilities, which it intends using as a storage yard for new and second-hand iron, machinery and other equipment.

The Elmore Mfg. Company, Clyde, Ohio, manufacturer of the Elmore automobile, has commenced work on another important addition to its plant, one large building having been completed a month ago. The company has more business in sight for 1907 than it can take care of.

Brown & Dick, Plymouth, Ohio, manufacturers of eave trough hangers and plumbing specialties, is erecting a new factory building. The company has sold its entire output of eave trough hangers for a term of years to a large jobbing firm in Cleveland.

The Ford Lighting Company, manufacturer of gas generating outfits, at present located at Elyria, is preparing to move its factory to Salem, Ohio.

The Gilman Automatic Filter Company has incorporated at Buffalo, N. Y., with a capital of \$10,000, to manufacture the Gilman patent filter. The incorporators are G. H. Gilman, G. W. Shepard and E. E. Tanner.

The plant of the Brantford Starch Works, Brantford, Ont., recently destroyed by fire, will be rebuilt at once at a cost of \$30,000, including machinery. The power house was not materially damaged.

The Hydro Press Company, with a capital of \$75,000, has incorporated at Rochester, N. Y., to manufacture builders', plumbers' and blacksmiths' supplies. The incorporators are P. Gommel, A. Nolte and F. A. Wegner, Rochester.

The American Fire Apparatus Company has been incorporated at Buffalo, N. Y., with a capital of \$30,000, to manufacture patented fire extinguishing apparatus and other chemical apparatus, by F. J. Bryant, New York, and C. P. Stevenson and August Becker, Buffalo. C. P. Stevenson, who is president of the Eastman Machine Company, is president of the new company.

The Buffalo Typesetting Machine Company has been incorporated at Buffalo, N. Y., to manufacture typesetting machines, by F. A. Hawley, C. P. Genthner and G. B. Hinkley, Buffalo. The company is capitalized at \$20,000.

The Syracuse Aluminum & Bronze Company, Syracuse, N. Y., is installing in its plant the equipment of the brass department of the Rochester Car Wheel Works, which it recently purchased. Although aluminum will continue to be the principal output the company will turn out brass and bronze castings.

The Washington Motor Car Company has incorporated at Washington, Ind., with \$150,000 capital stock. It will erect one of the largest plants of the kind in the State for the manufacture of motor cars and electrical supplies. Frank W. Fowler is president.

The Murello Motor Car Company has incorporated at Marion, Ind., with \$25,000 capital stock. The directors are Wilbur W. Myers, L. W. Coppock, Nicholas Helwig and Harry F. Reynolds.

The Federal Canning Machinery Company has incorporated at Indianapolis, Ind., with \$50,000 capital stock, to manufacture machinery, appliances, &c., to be used in canning industries. The directors are Walter A. Knight, John M. Paver and Murat W. Hopkins.

The tenth annual convention of the National Founders' Association will be held at the Hotel Astor, New York, November 14 and 15. The programme covers reports from strike centers, a discussion of education of apprentices and specialty molders in connection with a report of the Winona Training School Committee, a discussion of molding machines, and the consideration of injunctions from a practical standpoint and other matters of current interest. A banquet will be held on the evening of November 14, at which Congressman Littlefield of Maine, and Arthur A. Hamerschlag, director of the Carnegie Institute, Pittsburgh, will be the principal speakers.

The American Pig Iron Storage Warrant Company, 44 Wall street, New York, reports its total stock of pig iron on hand October 31 at 3900 tons. Receipts in October were 500 tons and deliveries 4900 tons.

The Iron and Metal Trades

Advices from Cleveland show that some of the Ore interests have opened their order books for the coming season and have entered a very considerable tonnage at advanced prices. The position of furnace managers who must now contract for Ore consumption up to the spring of 1908 is not an enviable one.

The Pig Iron markets continue in an unsettled condition, with little doing in the Central West, where there is very little available. On the seacoast and the territory tributary to it foreign Pig Iron is playing an increasing rôle. Aside from the Spiegel and Ferromanganese, of which we always import some, and Low Phosphorus Iron, of which at least one cargo of about 4000 tons has been sold at \$26.65 delivered in eastern Pennsylvania, there has been one cargo of foreign Bessemer ordered at a shade over \$23 delivered. The grades, however, of which the largest quantities are being ordered are Midlandsbrough and Scotch Foundry Irons. The English trade papers talk of purchases of warrants for American account aggregating 250,000 tons. This, of course, is very much exaggerated. So far as we can learn, shipments so far arranged during the whole of this movement will foot up to about 75,000 tons, some of which has arrived or is afloat, and the balance is to come forward during the next two months. This is certainly not an alarming quantity and must be rather regarded as a welcome relief to embarrassed melters.

All our plants are being driven at top notch speed, which is reflected in the October records that are now being published. The mills of the Steel Corporation report the breaking of 121 records, of which 71 are to the credit of the Carnegie Steel Company. The blast furnaces of the Steel Corporation produced in October 1,008,433 tons, as against 999,103 tons, the best previous record, in March, 1906. The steel plants made a record in October of 1,282,750 tons of ingots, as compared with 1,270,834 tons in March last.

With the exception of Structural Steel, the volume of orders keeps up at a tremendous rate, and runs in excess of current capacity, great as that is. Shipbuilders have booked four additional lake vessels, which call for 40,000 tons of Plates and Shapes, which have not yet been placed. There are some further large orders for Steel Cars in the market and some large requirements for locomotives have been placed or are being arranged for.

One of the leading Eastern makers of Cast Iron Pipe has taken the largest order ever booked by this long established concern.

In Tubes, some very important oil lines are being figured on, and there has come to hand an inquiry for 275 miles of 10-in. Pipe for Burmah.

The principal Bar Iron makers of the Pittsburgh District have advanced their prices to 1.80c., but some of them are figuring on a lower basis in competitive markets like Chicago.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

	Nov. 8, 1906.	Nov. 1, 1906.	Oct. 10, 1906.	Nov. 8, 1905.
PIG IRON, Per Gross Ton:				
Foundry No. 2, Standard, Philadelphia	\$22.75	\$22.50	\$21.00	\$18.00
Foundry No. 2, Southern, Cincinnati	23.00	20.50	20.00	16.50
Foundry No. 2, Local, Chicago ..	24.50	22.50	20.50	18.25
Bessemer, Pittsburgh	22.85	22.85	20.35	17.85
Gray Forge, Pittsburgh	22.85	20.85	19.35	16.35
Lake Superior Charcoal, Chicago	23.50	22.50	21.00	18.50
BILLETS, &c., Per Gross Ton:				
Bessemer Billets, Pittsburgh ..	28.50	29.00	28.00	26.00
Forging Billets, Pittsburgh ..	36.00	36.00	34.00	30.00
Open Hearth Billets, Phila.	34.00	34.00	32.50	30.00
Wire Rods, Pittsburgh	35.00	35.00	34.50	32.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
O. Steel Rails, Chicago	20.00	18.50	17.00	14.75
O. Steel Rails, Philadelphia ..	18.75	18.75	18.50	18.00
O. Iron Rails, Chicago	28.00	26.50	25.50	23.00
O. Iron Rails, Philadelphia ..	25.50	25.50	25.00	24.00
O. Car Wheels, Chicago	21.50	21.50	19.00	16.00
O. Car Wheels, Philadelphia ..	21.50	21.50	20.75	17.00
Heavy Steel Scrap, Pittsburgh ..	16.75	16.75	17.50	17.00
Heavy Steel Scrap, Chicago ..	17.50	17.00	16.50	15.25

FINISHED IRON AND STEEL,

Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined Iron Bars, Philadelphia.	1.83½	1.83½	1.83½	1.83½
Common Iron Bars, Chicago ..	1.71½	1.71½	1.71½	1.85
Common Iron Bars, Pittsburgh.	1.80	1.75	1.60	1.84½
Steel Bars, Tidewater, New York	1.64½	1.64½	1.64½	1.64½
Steel Bars, Pittsburgh	1.50	1.50	1.50	1.50
Tank Plates, Tidewater, New York	1.74½	1.74½	1.74½	1.74½
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.60
Beams, Tidewater, New York ..	1.84½	1.84½	1.84½	1.84½
Beams, Pittsburgh	1.70	1.70	1.70	1.70
Angles, Tidewater, New York ..	1.84½	1.84½	1.84½	1.84½
Angles, Pittsburgh	1.70	1.70	1.70	1.70
Skelp, Grooved Steel, Pittsburgh	1.57½	1.57½	1.57½	1.55
Skelp, Sheared Steel, Pittsburgh.	1.60	1.60	1.60	1.65

SHEETS, NAILS AND WIRE,

Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, No. 27, Pittsburgh	2.50	2.50	2.40	2.15
Wire Nails, Pittsburgh	1.85	1.85	1.85	1.80
Cut Nails, Pittsburgh	1.90	1.90	1.90	1.65
Barb Wire, Galv., Pittsburgh ..	2.30	2.30	2.30	2.25

METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake Copper, New York	22.50	22.25	22.00	16.50
Spelter, St. Louis	6.20	6.17½	6.05	6.00
Lead, New York	5.90	5.90	5.90	5.25
Lead, St. Louis	5.90	5.90	5.85	5.15
Tin, New York	42.50	42.25	42.50	33.20
Antimony, Hallett, New York ..	25.00	25.00	24.50	12.50
Nickel, New York	45.00	45.00	45.00	40.00
Tin Plate, Domestic, Bessemer,				
100 lb., New York	\$4.00	\$4.00	\$3.94	\$3.49

Chicago.

FISHER BUILDING, November 7, 1906.—(By Telegraph.)

Sales of small lots of foreign Low Phosphorus Pig Iron are now being made in this market to meet the current demand, and the general sale of all foreign Foundry grades is one of the probabilities of the immediate future, owing to the scarcity and high prices of local and Southern brands. One commission house is negotiating for a cargo of English Iron to be offered to the Western trade at a price approximating \$27 a ton. Although domestic spot Iron is still to be had at \$25.50, foreign Low Phosphorus is selling at \$28 Chicago, equivalent to \$24 tidewater, and the demand is heavier, as the furnaces operating on this grade are unable to meet the requirements of the Steel casting plants. A general tie-up of the 23 railroads entering Chicago is threatened by the Switchmen's Union of North America, and unless the demands of the members of this organization for increased wages are granted a strike may be declared this week. Nor is this agitation limited to the switchmen alone, as the engineers and firemen of many of the Western roads are preparing demands for shorter hours and higher wages. Every effort is being made by the railroads to avoid a conflict, although the ultimatum of the switchmen portends trouble if the new scale is not granted. In the South the car shortage has compelled the furnace operators to stock a portion of their output, while shipments from finishing mills throughout this district are delayed, owing to the inability of manufacturers to secure adequate car supplies from the railroads. Advances in the finished lines include \$2 a ton on Cast Iron Pipe and \$1 on Light Rails. New Plate business is heavy, the Illinois Steel Company having booked 30,000 tons during October, largely from lake shipbuilders,

and the tonnage now specified covers three months' output. On Structural Shapes the mills are depending on specifications that are received from day to day, and up to the present they have been of such volume that warrants continued capacity operations. The purchase of 6000 tons of Axle Billets by a local consumer for first half delivery at \$35, Chicago, is indicative of the strength of the Steel situation, and on Rods the American Steel & Wire Company has temporarily withdrawn from the market, having been compelled to shut down its Donora plant two days last week owing to Steel shortage. Iron Bars continue to be offered in this market at 1.71½¢, equivalent to 1.55¢, Pittsburgh, although the Republic Iron & Steel Company is maintaining a price of 1.75¢, Pittsburgh, on Eastern shipments and 1.60¢ for Western. There has been no halt in the upward movement of Old Material, notwithstanding the heavy railroad offerings, which aggregate nearly 10,000 tons this week.

Pig Iron.—Transactions have been almost entirely limited to small lots on track or in transit, and sales of Foundry grades with Silicon content ranging from 2½ to 3 per cent. have been made at \$26.50, Chicago, while ordinary No. 2 continues to be sold at \$25.50. For delivery during the first quarter Southern producers are asking \$20 to \$21, furnace, for No. 2, and for the second quarter prices have been advanced to \$19. Quotations on local iron for first quarter shipment are practically the same as for immediate delivery, Lake Superior Charcoal being sold at \$25 and Malleable Bessemer at \$24.50. Only small tonnages are available at these prices, and the continued upward movement will soon warrant the sale of all grades of foreign Foundry Iron in this market. The completion of the furnace of the Federal Furnace Company, South Chicago, has been delayed by a strike and the indications are that it will not be blown in before December. We quote as follows, f.o.b. Chicago:

Lake Superior Charcoal.....	\$23.50 to \$24.50
Northern Coke Foundry, No. 1.....	24.00 to 25.50
Northern Coke Foundry, No. 2.....	24.50 to 25.00
Northern Coke Foundry, No. 3.....	24.00 to 24.50
Northern Scotch, No. 1.....	25.00 to 25.50
Ohio Strong Softeners, No. 1.....	24.80 to 25.30
Ohio Strong Softeners, No. 2.....	24.30 to 24.80
Southern Coke, No. 1.....	24.40 to 24.90
Southern Coke, No. 2.....	23.90 to 24.40
Southern Coke, No. 3.....	23.40 to 23.90
Southern Coke, No. 4.....	22.90 to 23.40
Southern Coke, No. 1 Soft.....	24.40 to 24.90
Southern Coke, No. 2 Soft.....	23.90 to 24.40
Southern Gray Forge.....	21.90 to 22.40
Southern Mottled.....	21.40 to 21.90
Malleable Bessemer.....	24.00 to 24.50
Standard Bessemer.....	23.80 to 24.30
Jackson Co. and Kentucky Silvery, 6 %	26.30 to 26.80
Jackson Co. and Kentucky Silvery, 8 %	28.30 to 28.80
Jackson Co. and Kentucky Silvery, 10 %	30.30 to 30.80

Coke.—Practically all of the Western furnaces have covered their Coke supply through the first half of 1907, several having contracted through the entire year at prices ranging from \$3 to \$3.20 at oven, although a few that purchased during the summer paid as low as \$2.50 at the ovens. Connellsville Foundry Coke for immediate shipment is held at \$4, equivalent to \$6.65, Chicago, which is also the price asked for by-product grades. Virginia Coke is quoted at \$4 at oven, equivalent to \$6.25, Chicago.

Metals.—Copper maintains a stiff tone and the principal difficulty in this market is obtaining sufficient material. Consumers are general well covered, although the demand is active for small quantities for spot needs. We quote: Casting Copper, 23¼¢ to 24¼¢; Lake, 24¢ to 24¼¢, in car lots for prompt shipment; small lots, ¼¢ to ¾¢ higher; Pig Tin, car lots, 45¼¢; small lots, 46¼¢ to 46¾¢; Lead, Desilverized, 6.10¢ to 6.20¢, for 50-ton lots; Corroding, 6.80¢ to 6.90¢, for 50-ton lots; on car lots, 2¼¢ per 100 lb. higher; Cookson's Antimony, 28½¢, and other grades, 26½¢ to 27½¢; Sheet Zinc is 7.90¢ list, f.o.b. Lasalle, in car lots of 600-lb. casks. On Old Metals we quote: Copper Wire, 18¼¢; Heavy Copper, 18¼¢; Copper Bottoms, 17¼¢; Copper Clips, 18¢; Red Brass, 18¢; Red Brass Borings, 16¢; Yellow Brass, 13¼¢; Yellow Brass Borings, 12¼¢; Light Brass, 9¼¢; Lead Pipe, 5.40¢; Tea Lead, 5¢; Zinc, 5¢; Pewter, No. 1, 26¢; Tin Foil, 32¢; Block Tin Pipe, 27½¢.

(By Mail.)

Billets and Rods.—One of the largest Western manufacturers of axles, who formerly secured his Steel supply from the Illinois Steel Company, has placed an order with an outside mill for 5000 tons of Axle Billets for delivery the first half of next year at \$35 a ton. For prompt shipment in car lots an advance over this price of \$2 to \$3 is asked, and Forging Billets are now held at \$38. The American Steel & Wire Company has withdrawn from the Rod market and outside mills with only a slight supply at their disposal are quoting \$35, Pittsburgh, equivalent to \$38, Chicago.

Rails and Track Supplies.—Another advance of \$1 a ton has been made on Light Rails by the Illinois Steel Company, which became effective Monday, November 5. The minimum on Spikes in large lots is now 2.25¢, and as high as 2.75¢ can be readily secured for small lots for

immediate delivery. A Northwestern road has asked for quotations on 15,000 tons of Standard Section Rails for 1907 delivery. This is in addition to a large tonnage already placed. Quotations are as follows: Angle Bars, accompanying Rail orders, 1906 delivery, 1.50¢; carload lots, 1.75¢; Spikes, 2.25¢ to 2.50¢, according to delivery; Track Bolts, 2.65¢ to 2.75¢, base, Square Nuts, and 2.80¢ to 2.90¢, base, Hexagon Nuts. The store prices on Track Supplies range from 0.15¢ to 0.20¢ above mill prices. Light Rails, 30 to 45 lb. sections, \$32; 25-lb., \$33; 20-lb., \$34; 16-lb., \$35; 12-lb., \$36, f.o.b. mill. Standard Sections, \$28, f.o.b. mill, full freight to destination.

Structural Material.—During the month of October the new structural mill of the Illinois Steel Company at South Chicago broke all previous records by producing 18,300 tons of Shapes. Although this mill is well up on specifications, sufficient tonnage is being received from day to day to insure operations at full capacity. For the erection of the new Sherman Hotel which will be built in this city 7000 tons of Steel will be required and specifications will shortly be available. The American Bridge Company has received an order for 2500 tons of material from the Atlantic Portland Cement Company, Nazareth, Pa., to be used in the construction of the new cement plant. Mill quotations are unchanged, as follows: Beams and Channels, 3 to 15 in., inclusive, 1.86½¢; Angles, 3 to 6 in., ¼-in. and heavier, 1.86½¢; larger than 6 in. on one or both legs, 1.96½¢; Beams, larger than 15 in., 1.96½¢; Zees, 3 in. and over, 1.86½¢; Tees, 3 in. and over, 1.91½¢, in addition to the usual extras for cutting to extra lengths, punching, coping, bending and other shop work.

Plates.—New tonnage placed with the Illinois Steel Company in October reached a total of 30,000, the bulk of this business having been received from lake shipbuilding interests. This company now has specifications on its books which cover the production of 12 weeks, although Eastern mills are in position to make shipment in from two to three weeks on both Sheared and Universal sizes. Prices are as follows: Tank Plates, ¼-in. and heavier, wider than 6¼ and up to 100 in. wide, inclusive, car lots, Chicago, 1.76¼¢; 3-16 in., 1.86½¢; Nos. 7 and 8 gauge, 1.91½¢; No. 9, 2.01½¢; Flange quality, in widths up to 100 in., 1.86½¢; base, for ¼-in. and heavier, with the same advance for lighter weights; Sketch Plates, Tank quality, 1.86½¢; Flange quality, 1.96½¢. Store prices on Plates are as follows: Tank Plate, ¼-in. and heavier, up to 72 in. wide, 2¢ to 2.10¢; from 72 to 96 in. wide, 2.10¢ to 2.20¢; 3-16 in., up to 60 in. wide, 2.10¢ to 2.20¢; 72 in. wide, 2.35¢ to 2.45¢; No. 8 up to 60 in. wide, 2.15¢ to 2.25¢; Flange and Head quality, 0.25¢ extra.

Sheets.—Since the advance new business has fallen off to some extent, although a local mill reports the receipt of an order for 300 tons of Galvanized Sheets of assorted gauges. With only a few exceptions the independent mills are firmly maintaining the recently established price of the American Sheet & Tin Plate Company, and deliveries generally on all sizes are deferred from three to four months. Quotations as follows: Blue Annealed, No. 10, 1.96½¢; No. 12, 2.01½¢; No. 14, 2.06½¢; No. 16, 2.16½¢; Box Annealed, Nos. 17 to 21, 2.51½¢; Nos. 22 to 24, 8.56½¢; Nos. 25 and 26, 2.61½¢; No. 27, 2.66½¢; No. 28, 2.76½¢; No. 29, 2.86½¢; No. 30, 2.96½¢; Galvanized Sheets, Nos. 10 to 14, 2.71½¢; Nos. 15 and 16, 2.91½¢; Nos. 17 to 21, 3.06½¢; Nos. 22 to 24, 3.21½¢; Nos. 25 to 26, 3.41½¢; No. 27, 3.61½¢; No. 28, 3.81½¢; No. 30, 4.31½¢. Sheets from store, Blue Annealed, No. 12, 2.25¢; No. 14, 2.30¢; No. 16, 2.40¢; Box Annealed, Nos. 18 to 21, 2.70¢; Nos. 22 to 24, 2.75¢; No. 26, 2.80¢; No. 27, 2.85¢; No. 28, 2.95¢; No. 30, 3.35¢; Galvanized from store, Nos. 10 to 20, 3.20¢ to 3.25¢; Nos. 22 to 24, 3.45¢ to 3.50¢; No. 26, 3.55¢ to 3.60¢; No. 27, 3.65¢ to 3.85¢; No. 28, 4.00¢; No. 30, 4.55¢ to 4.60¢.

Bars.—Although manufacturers of Hoops informed the trade on October 25 that an advance of \$2 would become effective November 1 and booked a heavy tonnage in anticipation of higher prices no change was made in quotations last week. It is announced, however, that this advance can now be expected in a few days. While the Republic Iron & Steel Company is maintaining Iron Bars at a minimum of 1.75¢, Pittsburgh, for Western shipment, it is quoting at 1.60¢, Youngstown, owing to the competition of the Western independent mills, which are selling at 1.55¢, Pittsburgh, equivalent to 1.71½¢, Chicago. That this low price will shortly be withdrawn, however, is certain in view of the high prices that are ruling on Scrap, and consumers are buying freely in anticipation of an early advance. Although the orders on its books cover practically a year's production the Illinois Steel Company continues to sell Steel Bars at 1.66½¢, other large makers holding their product at an advance of \$2. We quote as follows: Iron Bars, 1.71½¢; Steel Bars, 1.66½¢ to 1.76½¢, both half extras; Hoops, 2.06½¢, extras as per Hoop card; Bands, 1.66½¢, as per Steel card; Soft Steel Angles and Shapes, 1.66½¢, half extras. Store prices are as follows: Bar Iron, 2.10¢ to

2.25c.; Steel Bars, 1.85c. to 2c.; Steel Bands, 1.85c. to 1.90c., half extras; Soft Steel Hoops, 2.35c. to 2.45c., full extras.

Merchant Pipe.—The demand continues heavy, and jobbers are buying freely to cover their future needs. On account of the increased cost of raw material it is probable that an early advance on Merchant Pipe will be made, although no official confirmation can yet be had. Iron Pipe is now held at an advance of from four to five points over Steel. We revise discounts, car lots, Chicago, as follows: Black Steel Pipe, 77.35, on the base sizes, $\frac{3}{4}$ to 6 in., and Galvanized, 67.35. From store in small lots Chicago jobbers quote 74½ to 75 per cent. on Black Steel Pipe, $\frac{3}{4}$ to 6 in.

Boiler Tubes.—The new business placed with the mills by both jobbers and consumers during the past week has been exceedingly heavy, the trade having anticipated its wants in view of the reports of another advance in prices. All concessions from store have been withdrawn and the trade in small lots is unusually active. Mill quotations are unchanged as follows on base sizes 2¼ to 5 in., in carload lots: Steel Tubes, 68.35; Iron, 55.35; Seamless, 50.35; 2½-in. and smaller and lengths over 18 ft., and 2½-in. and lengths over 22 ft., 10 per cent. extra. Store prices are unchanged, as follows:

	Steel.	Iron.	Seamless.
1 to 1½ in.	40	35	42½
1½ to 2¼ in.	50	35	35
2½ in.	52½	35	30
2½ to 3 in.	60	47½	42½
6 in. and larger.	50	35	..

Merchant Steel.—On account of the difficulties experienced by large consumers in securing material during the past few months specifications are now being forwarded to the mills covering requirements up to July 1 next year. New business, however, is light inasmuch as contracts covering the present production of the mills were placed by consumers during the early summer months. We quote: Planished or Smooth Finished Tire Steel, 1.86½c.; Iron Finish, up to 1½ x ½ in., 1.81½c.; Iron Finish, 1½ x ½ in. and larger, 1.66½c., base; Channels for solid rubber tires, ¾ to 1 in., 2.16½c., and 1½-in. and larger, 2.06½c.; Smooth Finished Machinery Steel, 1.91½c.; Flat Sleigh Shoe, 1.71½c.; Concave and Convex Sleigh Shoe, 1.96½c.; Cutter Shoe, 2.35c.; Toe Calk Steel, 2.21½c.; Railway Spring, 1.86½c.; Crucible Tool Steel, 9½c. to 8c., and still higher prices are asked on special grades. Shafting, 50 per cent. off in car lots, and 45 per cent. in less than car lots, in base territory.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Company this week announced an advance of \$2 a ton on 4-in. pipe and on all sizes over 12 in., and \$1.50 on the 6, 8, 10, and 12 in. sizes. The Northern Pacific Railroad Company, which was in the market last week for 2500 tons of culvert Pipe purchased only 1000 tons in view of the high prices that are ruling. Quotations are as follows: Water Pipe, 4-in., \$36; 6, 8, 10 and 12 in., \$34.50; over 12-in., \$34, with \$1 extra for Gas Pipe.

Old Material.—The movement of the Scrap market is steadily upward, sales of Cast Scrap amounting to 3000 tons having been made the past few days at \$17.50 to \$17.75, Chicago. Iron Rails are now held at \$28 to \$29, and only a small quantity is available at these prices. Iron mills are again making inquiry for Wrought Scrap, and dealers anticipate heavy sales within the next 10 days. The market on this material has likewise advanced, and No. 1 grade is quoted at \$18.50. Railroad lists, covering practically all grades, aggregating over 9000 tons, have been issued by the following roads: Baltimore & Ohio, 5500 tons, including 1500 tons of Steel Rails in rerolling sections; Evansville & Terre Haute, 200 tons; Chicago & Eastern Illinois, 200 tons; Atchison, Topeka & Santa Fe, 2000 tons; Chicago, Rock Island & Pacific, 700 tons; Grand Trunk, 600 tons. Quotations on gross tons, car lots, f.o.b. Chicago, are as follows:

Old Iron Rails.	\$28.00 to \$29.00
Old Steel Rails, 4 ft. and over.	21.00 to 21.50
Old Steel Rails, less than 4 ft.	20.00 to 20.50
Heavy Relaying Rails, subject to inspection, 50 lb. and under.	29.00 to 31.00
Old Car Wheels.	21.50 to 22.00
Heavy Melting Steel Scrap.	17.50 to 18.00
Frogs, Switches and Guards.	18.50 to 19.00
Mixed Steel.	15.00 to 15.50

The following quotations are per net ton:

Iron Fish Plates.	\$22.50 to \$23.00
Iron Car Axles.	27.00 to 27.50
Steel Car Axles.	23.00 to 23.50
No. 1 Railroad Wrought.	18.00 to 18.50
No. 2 Railroad Wrought.	17.00 to 17.50
Railway Springs.	16.00 to 16.50
Locomotive Tires, smooth.	16.00 to 16.50
No. 1 Dealers' Forge.	13.50 to 14.00
Mixed Bushelling.	11.50 to 12.00
Iron Axle Turnings.	11.00 to 11.50
Soft Steel Axle Turnings.	11.00 to 11.50
Machine Shop Turnings.	11.00 to 11.50
Cast Borings.	9.00 to 9.50
Mixed Borings, &c.	9.00 to 9.50
No. 1 Mill.	10.50 to 11.00
No. 2 Mill.	9.50 to 10.00
No. 1 Rollers, cut to Sheets and Rings.	12.50 to 13.00
No. 1 Cast Scrap.	17.50 to 18.00
Stove Plate and Light Cast Scrap.	13.50 to 14.00
Railroad Malleable.	16.50 to 17.00
Agricultural Malleable.	15.50 to 16.00

Philadelphia.

REAL ESTATE TRUST BUILDING, November 6, 1906

The further we go the more complicated the position becomes as regards Pig Iron. No conservative person would venture to say that prices will be either higher or lower two months hence, and no one well informed in regard to the situation would give a direct answer as to what the present price of Pig Iron is without a little study. With each price certain conditions are attached, and as these vary in nearly every transaction it can easily be seen what a maze of uncertainty prevails, although at the moment there is no loss of strength, but the reverse. Whether the tendency is toward higher or lower prices is another difficult problem. In a week or two from now it will probably be less difficult to solve, as the October production will be known; also the influence of foreign Iron can be estimated with some degree of confidence, which is not the case at the present time. Some large shipments are being made, including one or more cargoes of Low Phosphorus to Baltimore, one of Bessemer to Philadelphia and cargoes of Middlesbrough Iron as follows: Black Prince, Middlesbrough to Philadelphia, 5000 tons; Annie, Middlesbrough to Philadelphia, 5700 tons; Cameron, Middlesbrough to Philadelphia, 4600 tons; Tiger, Middlesbrough to New York, 4600 tons; Steamer, Middlesbrough to Philadelphia, 5000 tons. If precedents count for anything there should be a decided easing up between now and the end of the year, but precedent has been so utterly ignored the past year or two that the trade seems to leave it out of their calculations. Perhaps it might be well to substitute for it the aphorism which says, "All things come to him who waits." It will surely apply sooner or later. Prices are not much higher than they were a week ago, but they are stronger. No business is being done at less money; some is being done at a little higher figures, but the circumstances were exceptional and have little or no bearing on the general market, so that the best that can be said is that prices are strong without being actually higher. As far as the present outlook is concerned there is no indication of less favorable conditions, but it is a question if we can absorb the avalanche of material which is being sent to help us out. As a temporary expedient it is helpful in the highest degree, but there may be some danger in not knowing when we have got enough. The shortage may not be quite as great as it has been, but the fears of shortage are not abated, so that there is still considerable anxiety, especially as regards the winter months. It is a remarkable fact, however, that after so long a period of high pressure activity there is not the slightest indication of anything that can be called reactionary.

Pig Iron.—It is hard to quote prices with anything approaching definiteness. Everything depends upon the circumstances in each particular case. In some instances \$22.50 to \$22.75 could be done for No. 2 X Foundry, second quarter, 1907; in others \$23 to \$23.50, while for 1906 or first quarter 1907, \$23.50 to \$24 would be named. The same divergence in a less degree may be noted in other grades, such as Basic, which while quoted at \$20.50 would be very hard to get even at \$21 early delivery, everything being close sold up until about April. If in the meanwhile any of the furnaces should have a prospect of a little surplus it would be taken at fancy prices to fill up where there are shortages, so that the best that can be done is to even things up. How much relief will be obtained by the use of foreign Iron remains to be seen, but the tonnage afloat and to be loaded for this and other ports would have given the trade a shock a few months ago. For the present, however, it has had no adverse influence, as everything offered is promptly taken at the full prices of last week. In view of the early arrivals of several cargoes and the expected increase in our own output it is hardly likely that prices can go much, if any, higher. The natural inference would be that buyers will wait to see what the effect will be, as the tendency is almost certain to be toward easier conditions temporarily if not permanently. The imports are of a more varied character than has ever been known, comprising Bessemer, Low Phosphorus, Middlesbrough Nos. 1 and 3, besides various grades of Scotch Iron. Consumption is unquestionably at the highest limit ever reached, but in the past it has invariably happened that Pig Iron came out ahead in the long run, and it will be something unusual if it does not do so again. There are many difficulties to be met with in regard to increasing the Pig Iron supply, but eventually they will be overcome, it being merely a question of time when there will be plenty of Iron to go around. As nearly as can be given prices are within the range given below for deliveries in eastern Pennsylvania and adjoining districts during first and second quarters of 1907, premiums of 50c. to \$1 being paid for 1906 deliveries:

No. 1 X Foundry.	\$24.00 to \$25.00
No. 2 X Foundry.	22.75 to 23.50
No. 2 Plain.	22.25 to 22.75
Standard Gray Forge.	20.50 to 21.00
Ordinary Gray Forge.	19.00 to 19.50
Basic.	20.50 to 21.00
Low Phosphorus.	26.50 to 27.00
Malleable.	22.00 to 23.00
Middlesbrough No. 1, on dock.	22.50 to 23.00

Middlesbrough No. 3, on dock.....	21.00 to 21.50
Scotch, on dock.....	22.75 to 23.50

Ferroalloys.—Business is a little dull and the tendency is toward easier conditions. November and December shipments could be done at \$78 to \$80 and at \$73 to \$75 for first half of 1907. Ferrosilicon, \$98 to \$102, this year's deliveries.

Steel.—The market is very strong, and last week's prices are fully maintained at \$34 to \$36 for ordinary Open Hearth Steel Billets and \$38 to \$40 for Forging Steel. Mills are full of work, with great pressure for prompt shipments.

Plates.—There is no particular change in the Plate trade. Business is good, and in view of the higher cost of raw material consumers are placing large orders as a protection against an advance in the finished article. Prices are truly out of proportion with the increased cost of production, but for the present they remain as follows:

	Carload. Cents.	Part carload. Cents.
Tank, Bridge and Boat Steel.....	1.73½	1.78½
Flange or Boiler Steel.....	1.83½	1.88½
Marine.....	2.13½	2.18½
Locomotive Firebox Steel.....	2.23½	2.28½

The above are base prices for ¼-in. and heavier. The following extras apply:

	Extra per 100 pounds.
3-16 in. thick.....	\$0.10
Nos. 7 and 8, B. W. G.....	.15
No. 9, B. W. G.....	.25
Plates over 100 to 110 in.....	.05
Plates over 110 to 115 in.....	.10
Plates over 115 to 120 in.....	.15
Plates over 120 to 125 in.....	.25
Plates over 125 to 130 in.....	.50
Plates over 130 in.....	1.00

Structural Material.—Conditions are in all respects about as noted in recent reports. There is demand enough to keep all the mills busy, but the steadily increasing capacity for production prevents congestion, so that fairly prompt deliveries can be had at about 1.83½c. to 2c. for Beams, Channels and Angles, according to specifications.

Bars.—The demand for Bars is improving, and prices are decidedly firmer at 1.83½c. for carload lots and upward. This appears to be a minimum figure for Best Refined Iron, although one or two mills making only a few sizes are shading a little, but this has no influence on the general market. Steel Bars command about the same figure as Refined Iron for prompt shipments, although officially they are quoted at less money, but deliveries could not be promised during 1906.

Sheets.—The demand is good and prices are steady as follows for carload lots and a tenth additional for smaller quantities: Nos. 18 to 20, 2.60c.; Nos. 22 to 24, 2.70c.; Nos. 25 and 26, 2.80c.; No. 27, 2.90c., and No. 28, 3c.

Old Material.—There is not much change from last week, but prices are firm, and in some cases a trifle higher. Bids and offers for deliveries in buyers' yards are about as follows:

Steel Crops.....	\$18.75 to \$19.50
No. 1 Steel Scrap.....	18.25 to 18.50
Low Phosphorus Scrap.....	22.50 to 23.00
Old Steel Axles.....	22.50 to 23.00
Old Iron Axles.....	31.00 to 31.50
Old Iron Rails.....	25.50 to 26.50
Old Car Wheels.....	21.50 to 22.50
Choice Scrap, R. R. No. 1 Wrought.....	22.00 to 22.50
Choice No. 1 Yard Scrap.....	19.00 to 20.00
Long and Short.....	18.50 to 18.75
Machinery Scrap.....	18.50 to 19.00
Wrought Iron Pipe.....	16.00 to 16.50
No. 1 Forge Fire Scrap.....	16.50 to 17.00
No. 2 Light Ordinary.....	11.50 to 12.00
Wrought Turnings.....	14.25 to 14.75
Axle Turnings, Choice Heavy.....	15.75 to 16.25
Stove Plate.....	13.50 to 14.00
Cast Borings.....	11.25 to 11.50
Grate Bars.....	13.50 to 14.00

Cincinnati.

FIFTH AND MAIN STS., November 7, 1906.—(By Telegraph.)

Pig Iron.—Through an error the schedule of prices in last week's issue which was intended to cover next year's delivery, appeared as the current spot market, causing some perplexity to those who base their sales upon *The Iron Age* quotations. We therefore make this correction trusting that it will be acceptable to all concerned. The market this week has grown more strenuous, and Iron is difficult to obtain for anything like nearby delivery. Reports indicate that not only is spot Iron in available quantities exhausted, but a number of the Southern producers have sold a large proportion of their output for the first half of next year. The market is very irregular. Apparently there are three quotations that represent the basis of trade to-day, namely, spot, first quarter and first half. Sales of spot are reported from \$20 to \$21, first quarter at \$18 and first half at \$17.50, Birmingham basis, which quotations are fairly well established. It is said that some of the largest Southern producers may have considerable tonnage for shipment over the first part of next year, but are refusing to contract at present, possibly with the hope that as the year advances prices

will to a great extent dovetail into each other. The Northern situation is stated to be less favorable than the Southern, and it is almost an utter impossibility to obtain Iron for prompt shipment. Sales, however, in a small way are reported at \$23 at furnace, with \$20.50 the ruling quotation for first half of next year. There is one inquiry from an Ohio concern for 2000 tons of Malleable, with any number of them ranging from 200 to 500 tons. Freight rates from Hanging Rock district to Cincinnati are \$1.15, and from Birmingham \$3. We quote f.o.b. Cincinnati as follows:

Southern Coke, No. 1.....	\$24.00 to \$25.00
Southern Coke, No. 2.....	23.00 to 24.00
Southern Coke, No. 3.....	22.00 to 23.00
Southern Coke, No. 4.....	21.00 to 22.00
Southern Coke, No. 1 Soft.....	24.00 to 25.00
Southern Coke, No. 2 Soft.....	23.00 to 24.00
Southern Coke, Gray Forge.....	20.00 to 21.00
Southern Coke, Mottled.....	19.00 to 20.00
Ohio Silvery, 8 per cent.....	27.30
Lake Superior Coke, No. 1.....	24.65
Lake Superior Coke, No. 2.....	24.15
Lake Superior Coke, No. 3.....	23.65

Car Wheel Irons.

Standard Southern Car Wheel.....	\$26.50 to \$27.00
Lake Superior Car Wheel.....	26.00 to 26.50

Finished Iron and Steel.—The demand is strong. Prices are firm, with new work reaching into next year coming forward. We quote, f.o.b. Cincinnati, as follows: Iron Bars, in carload lots, 1.73c., with half extras; the same, in smaller lots, 2c., with full extras; Steel Bars, in carload lots, 1.63c., with half extras; the same, in smaller lots, 1.85c., with full extras; Base Angles, 1.83c., in carload lots; Beams and Channels, in carload lots, 1.83c.; Plates, ¼-in. and heavier, 1.73c., in carload lots; in smaller lots, 1.90c.; Sheets, 16 gauge, in carload lots, 2.15c.; in smaller lots, 2.70c.; 14 gauge, in carload lots, 2.05c.; in small lots, 2.60c.; Steel Tire, 1 x ¼ in. or heavier, 1.83c., in carload lots.

Old Material.—Dealers are finding a strong demand for all the Scrap obtainable at high figures. We quote dealers' prices, f.o.b. Cincinnati, as follows:

No. 1 Railroad Wrought, net ton.....	\$18.00 to \$19.00
Cast Borings, net ton.....	9.00 to 10.00
Steel Turnings, net ton.....	11.00 to 12.00
No. 1 Cast Scrap, net ton.....	16.00 to 17.00
Old Iron Axles, net ton.....	26.00 to 27.00
Old Iron Rails, gross ton.....	24.50
Old Steel Rails, long, gross ton.....	17.00 to 18.00
Relaying Rails, 56 lb. and up, gross ton.....	28.00 to 29.00
Old Car Wheels, gross ton.....	18.00 to 19.00
Low Phosphorus Scrap, gross ton.....	19.00 to 20.00

Pittsburgh.

PARK BUILDING, November 7, 1906.—(By Telegraph.)

Iron Ore.—At a meeting of the Ore producers, held in Cleveland, November 2, prices for next season were agreed upon, Old Range and Mesaba non-Bessemer being advanced 50c. a ton, or from \$3.75 to \$4.25 for Old Range and \$3.50 to \$4 for Mesabas. Old Range Bessemer were advanced from \$4.25 to \$5 and Mesaba Bessemer from \$4 to \$4.75. Guarantees in Old Range and Mesaba Bessemer were reduced from 56.70 to 55 per cent.. On Old Range non-Bessemer guarantees on natural Iron were reduced from 52.80 to 51.50 per cent., and on Mesaba non-Bessemer from 53 to 51.50 per cent. These advances in Ore will mean an increased cost next year for making Basic Iron over this year of about \$1. a ton and on Bessemer about \$1.50 a ton.

Pig Iron.—Sales the past week have been light. Bessemer and Basic Iron are held at \$22 minimum, Valley furnace, and possibly higher would be paid for prompt Iron. A speculative lot of 6000 to 7000 tons of standard Iron in storage at Ironton, Ohio, is reported to have been sold on the basis of \$23 to \$23.50, Ironton, and it is reported to have been bought by consumers in that district. Northern No. 2 Foundry Iron has sold in small lots for spot shipment at \$23.50 and \$24, Valley furnace. For delivery in first quarter of next year from \$22.50 to \$23.50, Valley furnace, is quoted. We note a sale of 500 tons of Northern Forge Iron for prompt shipment at \$22 and another lot of 500 tons for prompt shipment at \$22.50, Valley furnace. We also note sales of 3000 to 4000 tons of Northern Forge for delivery in first half of next year at \$21, Valley furnace.

Steel.—A sale is reported of 1000 tons of 4 x 4 in. Billets at \$28, Pittsburgh. This Steel is said to have been sold by a middleman, who was compelled to furnish shipping directions for the Steel this month. We quote Bessemer Billets at \$28.50 to \$29, and Open Hearth, \$31 to \$32, Pittsburgh. Sheet Bars are held at about \$30, Pittsburgh, but some are being offered at a local mill that is only an occasional seller at about \$29.50, Pittsburgh.

(By Mail.)

Buying has been light, probably due to hesitation of consumers until they learn the result of the elections. There were several sales of small lots of Bessemer and Basic Iron for prompt delivery at about \$22, Valley furnace, while Northern No. 2 Foundry has sold in a small way at \$24, Valley furnace, for spot shipment, and Northern

Forge at \$22, Valley furnace, for prompt delivery. The Steel situation seems to be easing a little, the enormous records for output made at nearly all the Steel plants in October increasing the supply for the outside market materially. Bessemer Billets for this year's delivery would readily bring \$29 to \$30 and Open Hearth \$31 to \$32 or higher. Prices have reached that point where there is no incentive for consumers to contract ahead, and for this reason it is likely that a good part of the new business booked by the mills from this time forward will be for reasonably prompt delivery. At the same time it is a fact that most of the leading Steel interests are pretty well sold up on everything they make for a good part of the first six months of next year.

Ferromanganese.—Prices continue very firm and inquiries have been active for some time. We quote 80 per cent. Ferro, forward delivery, at \$75 to \$77.50, and \$80 to \$82.50, prompt shipment. We note a sale of about 50 tons of 80 per cent. Ferro for November and December delivery at about \$80, Pittsburgh.

Wire Rods.—It is extremely difficult to get Rods for prompt delivery at any price owing to shortage in Steel and the fact that the two leading makers have not been selling Rods in the open market for some time. We quote Bessemer Rods at \$35, and Open Hearth, \$36 to \$37, Pittsburgh.

Muck Bar.—Prices are higher due to the heavy demand and to the scarcity and very high prices being paid for Forge Iron. We quote best grades of Muck Bar, made from all Pig Iron, at \$35, and from part Scrap at \$31 to \$32, Pittsburgh.

Skelp.—There is some inquiry, but the mills are running mostly on specifications on contracts which are coming in freely. We quote: Grooved Steel Skelp, 1.57½c. to 1.65c.; Sheared Steel Skelp, 1.60c. to 1.70c.; Grooved Iron Skelp, 1.65c. to 1.75c.; Sheared Iron Skelp, 1.80c. to 1.85c., Pittsburgh, these prices depending on widths and gauges.

Steel Rails.—During the week the Carnegie Company took contracts for upward of 25,000 tons of Standard Sections, of which 17,500 tons was for the South & Western Railroad, the balance of this contract, about 10,000 tons, going to the Pennsylvania Steel Company. The Carnegie Company also took orders for about 2500 tons of Light Rails. While the company has not officially advanced prices on Light Rails, it is quoting higher figures in some cases. We quote Light Rails as follows: 20 to 45 lb. Sections, \$31; 16-lb. Sections, \$32, and 12-lb. Sections, \$33, at mill. Standard Sections are \$28, at mill.

Structural Material.—In October the American Bridge Company booked a little over 60,000 tons, of which nearly 20,000 tons was bridge work for one of the Western railroads, taken the past week. The McClintic-Marshall Construction Company has taken a considerable tonnage of bridge work for one of the Eastern roads. While it is late in the year a good deal of work is in sight, much of which has been held back, waiting the result of the elections. The mills are now able to make prompt deliveries on the medium sizes of Beams and Channels ranging from 6 to 12 in. The market is firm and we quote: Beams and Channels, up to 15-in., 1.70c.; over 15-in., 1.80c.; Angles, 3 x 2 x ¼-in. thick up to 6 x 6 in., 1.70c.; 8 x 8 and 7 x 3½ in., 1.80c.; Zees, 3-in. and larger, 1.70c.; Tees, 3-in. and larger, 1.75c. Under the Steel Bar card Angles, Channels and Tees under 3-in. are 1.60c., base, for Bessemer and Open Hearth, subject to half extras on the Standard Steel Bar card.

Plates.—Four more lake vessels have been taken by the American Shipbuilding Company, the Plates and Shapes for which will run over 40,000 tons, and have not yet been placed with the mills. The mills have an enormous tonnage on their books, the leading interest being filled for the first three or four months of next year. Extraordinary records for output were made in October by the Carnegie Steel Company, Jones & Laughlin Steel Company and the other large mills. The mills are from four to eight weeks or longer behind in deliveries on Universal and Sheared Plates, but it is understood that some of the Eastern mills can make reasonably prompt shipments. The market is unchanged, but firm, and we quote: Tank Plates, ¼ in. thick, 6¼ in. up to 100 in. in width, 1.60c., base, at mills, Pittsburgh. Extras over this price are as follows:

	Extra per 100 lb.
Gauges lighter than ¼-in. to and including 3-16-in.	
Plates on thin edge.....	\$0.10
Gauges Nos. 7 and 8.....	.15
Gauge No. 9.....	.25
Plates over 100 to 110 in.....	.05
Plates over 110 to 115 in.....	.10
Plates over 115 to 120 in.....	.15
Plates over 120 to 125 in.....	.25
Plates over 125 to 130 in.....	.50
Plates over 130 in.....	1.00
All sketches (excepting straight taper Plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.).....	.10
Complete Circles.....	.20
Bolter and Flange Steel Plates.....	.10
"A. B. M. A." and ordinary Firebox Steel Plates.....	.20
Still Bottom Steel.....	.30
Marine Steel.....	.40
Shell Grade of Steel is abandoned.	

TERMS.—Net cash 30 days. For anticipated payments a maximum discount may be allowed at the rate of 6 per cent. per annum and for a longer time than 30 days interest shall be charged at the same rate per annum. Invoices paid within 10 days from date thereof, discount of ½ of 1 per cent. is allowable. Pacific Coast base, 1.60c., f.o.b. Pittsburgh, with all rail tariff rate of freight to destination added, no reduction for rectangular shapes 14 in. wide down to 6 in. of Tank, Ship or Bridge quality.

Sheets.—New business has fallen off to some extent in the past two weeks, most large consumers having covered their requirements through first quarter of next year before the recent advance in prices was made. However, a fair amount of new tonnage is being placed, and consumers are specifying freely on contracts, shipments by the mills being heavy. The continued scarcity of Sheet Bars and shortage in supply of cars are restricting output and shipments of Sheets to some extent. Prices are firm as follows: Blue Annealed Sheets, No. 10 gauge and heavier, 1.80c.; Nos. 11 and 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 2c.; Box Annealed, Nos. 17 to 21, 2.35c.; Nos. 22 to 24, 2.40c.; Nos. 25 and 26, 2.45c.; No. 27, 2.50c.; No. 28, 2.60c.; No. 29, 2.75c.; No. 30, 2.85c. We quote Galvanized Sheets as follows: Nos. 10 and 11, 2.55c.; Nos. 12 and 14, 2.65c.; Nos. 15 and 16, 2.75c.; Nos. 17 to 21, 2.90c.; Nos. 22 and 24, 3.05c.; Nos. 25 and 26, 3.25c.; No. 27, 3.45c.; No. 28, 3.65c.; No. 29, 3.90c., and No. 30, 4.15c. We quote No. 28 Gauge Painted Roofing Sheets at \$1.85 per square, and Galvanized Roofing Sheets, No. 28 Gauge, \$3.15 per square for 2-in. corrugations. These prices are for carload lots, jobbers charging the usual advances for small lots from store.

Iron and Steel Bars.—The leading mills rolling Iron Bars, such as the Republic, Lockhart and others, have again advanced prices on Iron Bars \$1 a ton, and now quote 1.80c. minimum f.o.b. Pittsburgh, for carloads and larger lots. New business in both Iron and Steel Bars continues enormously heavy, and all the mills are six to eight weeks or more behind in shipments. Carnegie and Jones & Laughlin continue to quote 1.50c. on Steel Bars for indefinite delivery, but all the other mills are quoting 1.60c. for shipment within four to six weeks, and are booking some business at this price. We quote Iron Bars at 1.80c. to 1.85c. Pittsburgh, depending on deliveries, and Steel Bars at 1.50c. to 1.60c. base, half extras, f.o.b. Pittsburgh. On both Iron and Steel Bars the lower prices quoted are for indefinite delivery.

Hoops and Bands.—The volume of business continues heavy and specifications are coming in freely. The mills are crowded with work, having enough orders on their books to take their output for several months. As noted in this report last week it has been decided by the leading interests not to make any advance in prices of Hoops for the time being at least. We quote: Steel Hoops, 1.90c., and Bands for all purposes at 1.50c., base, half extras, as per Standard Steel card. These prices are for carload lots, f.o.b. Pittsburgh, plus full tariff rail rate to point of delivery, an advance of \$2 a ton being charged for less than carloads.

Tin Plate.—Some very large inquiries from Can manufacturers for Bright Plates for delivery over the first six months of next year are in the market, and it is expected that a part of this business will be placed in a short time. The Tin Plate mills have a very heavy tonnage on their books for delivery through the first quarter and first half of next year, all of which was placed before the recent advance in prices, the orders for second quarter delivery having been taken at the present official price. There is still a shortage in supply of Tin Bars, which is restricting the output of Tin Plate to a considerable extent. We quote \$3.90 per base box, f.o.b. Pittsburgh, for 14 x 20 100-lb. Cokes, terms 30 days, less 2 per cent. off for cash in 10 days, on which price a rebate of 5c. a box is allowed for carload and larger lots.

Railroad Spikes.—The demand continues exceptionally heavy, several of the leading makers having their product sold up to April of next year, or longer. Upward of \$3 per 100 lb. has been paid frequently for Spikes for prompt delivery. We quote on contracts for indefinite delivery at \$2.40 to \$2.50 per 100 lb.

Spelter.—The demand continues fairly active and prices are firm. We quote prime grades of Western at 6.15c., St. Louis, equal to 6.27½c., Pittsburgh.

Pipes and Tubes.—An inquiry is in the market for 275 miles of 10-in. Line Pipe for export, presumably for the Burmah Oil Company of India. Three or four leading mills have this inquiry and are now figuring on it. It is a very desirable order and will likely bring out some keen competition. Nothing further has been heard regarding the 450 miles of 8-in. Line Pipe for the Guffey Oil Company, but some definite advices regarding this inquiry are looked for in a short time. The current demand for Merchant Pipe is heavy, the tonnage booked by the leading interest in October, and by some of the outside mills as well, being the greatest in any one month in their history. The extreme discount on Merchant sizes of Steel Pipe is now 79 and 5 per cent. off to the large trade. The new official discounts, which became effective on October 12, but which are shaded one point or more to the large trade, are as follows:

Merchant Pipe.

	Jobbers, carloads.			
	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
3/4 and 1 1/4 in.	70	54	65.5	49.5
1 1/2 in.	72	58	65.5	57.5
2 in.	74	62	73.5	63.5
2 1/2 to 6 in.	78	68	73.5	63.5
7 to 12 in.	73	58	69	54
Extra strong, plain ends:				
3/4 to 1 1/4 in.	63	51	58.5	46.5
1 1/2 to 2 in.	70	58	65.5	53.5
2 1/2 to 4 in.	66	54	61.5	48.5
Double extra strong, plain ends:				
3/4 to 8 in.	59	48	53.5	42.5

Boiler Tubes.—The market on Locomotive and Merchant Tubes is firm, all former concessions in prices having been withdrawn, but as yet there are no signs of an advance in prices. Inquiries are good and specifications on contracts are coming forward freely. Official discounts are as follows:

Boiler Tubes.

	Iron.	Steel.
1 to 1 1/4 in.	45	50
1 1/2 to 2 1/4 in.	45	62
2 1/2 in.	50	64
2 3/4 to 5 in.	57	70
6 to 13 in.	45	62

Iron and Steel Scrap.—There is a fair amount of inquiry for Scrap, but most leading consumers are pretty well covered, and actual buying is rather light. Prices quoted by dealers per gross ton f.o.b. Pittsburgh, are about as follows: Heavy Steel Melting Scrap, \$16.75 to \$17; No. 1 Wrought Scrap, \$19.25 to \$19.50; Old Steel Rails, short pieces for Open Hearth use, \$16.75 to \$17; Old Steel Rails, rerollers, \$18.75 to \$19; Bundled Sheet Scrap, \$15.50 to \$15.75; Cast Iron Borings, \$10.25 to \$10.50; Steel Axles, \$22.50 to \$23; Iron Axles, \$28 to \$28.50; Wrought Turnings, \$12.75 to \$13, and Old Car Wheels, \$19.50 to \$20.

Coke.—The demand for both Furnace and Foundry Coke is as strong as ever, and the supply seems limited. Strictly Connellsville Furnace Coke for prompt delivery has sold as high as \$3.15 to \$3.25 at oven, while for first quarter and first half of next year nothing less than \$3 at oven is being asked. Best grades of Connellsville 72-hr. Foundry Coke are selling at \$3.75 up to \$4.25 at oven. The output in the Upper and Lower Connellsville regions last week was a little over 375,000 tons. The car supply is reported as fairly satisfactory, and shipments are heavy.

The Hausman & Wimmer Company, which formerly conducted a Scrap Iron business at Greenough street, Pittsburgh, Pa., has removed all stock from that place to its yards at Carnegie, Pa.

Birmingham.

BIRMINGHAM, ALA., November 4, 1906.

Pig Iron.—With the market in its present unsettled and excited condition it is impossible to fix a price with any degree of accuracy, as each day brings its changes and quotations are now made for immediate acceptance only. Recently, on quotations made for telegraphic acceptance, orders have been refused the day following, and the delay of a single day in a number of instances has forced buyers to pay an extra 50c. for their Iron. Saturday quotations were about as follows on a No. 2 Foundry basis: For immediate shipment, \$22; delivery during first quarter next year, \$20; delivery during second quarter, \$18 to \$18.50. One sale of 6000 tons for delivery during first half of 1907 is reported to have been made at \$19. This was for shipment into Chicago territory. Not all business offered is being accepted even at present prices, the furnaces stating they are reserving a certain tonnage for regular customers. They also ask that melters will be as conservative as possible in estimating tonnage required and the time of delivery, believing that production has not yet caught up with consumption, and desiring to do all in their power to relieve a situation which appears to be gradually growing worse instead of better. The car situation continues bad, with little or no hope for immediate improvement. The demand exceeds the supply several times over, and while the railroad officials are doing everything in their power to better conditions they frankly state that they do not anticipate any permanent relief during this winter. The coal mines are operating only about half time on account of scarcity of coal cars.

The furnace of the Quinn Furnace Company at Gadsden is temporarily out of blast owing to inability to secure labor. Charcoal Iron is made at this stack, the demand for this grade of Iron being much greater than the supply, and it is now selling at \$25 to \$26 per ton.

The old Williamson Furnace, which was one of the first built in the Birmingham District, is being put in shape to start, and will go in blast as soon as a supply of raw material can be assembled. It has an estimated capacity of only about 100 tons daily, and is never operated except when Iron is bringing fancy prices.

Cast Iron Pipe.—With the Pig Iron market in its pres-

ent unsettled condition manufacturers are reluctant about bidding on large contracts for future delivery, as those who have not already covered not only do not know what price they will be required to pay, but whether the desired grades can be secured at all. While there has been a considerable advance in the cost of raw material within the past few weeks, as yet quotations on Water Pipe are unchanged and are approximately as follows: 4 to 6 in., \$31; 8 to 12 in., \$30; over 12 in., \$27.50, with \$1 per ton extra for Gas Pipe. On large contracts these prices might be slightly shaded.

Old Material.—In sympathy with the Pig Iron market, Scrap continues to advance. Dealers find ready sale for all they are able to secure, but like Pig Iron it, too, is getting scarce. Especially is this true of Cast. Dealers' quotations, subject to change, are to-day approximately as follows per gross ton, f.o.b. cars here:

Old Iron Rails	\$20.00 to \$20.50
Old Iron Axles	18.50 to 19.00
Old Steel Axles	16.00 to 17.00
Old Car Wheels	17.00 to 18.00
No. 1 Railroad Wrought	17.00 to 17.50
No. 2 Railroad Wrought	14.50 to 15.00
No. 1 Country Wrought	14.50 to 15.00
No. 2 Country Wrought	11.50 to 12.00
Wrought Pipe and Flues	11.50 to 12.00
Railroad Malleable	13.00 to 13.50
No. 1 Steel	14.00 to 14.50
No. 1 Machinery Cast	15.00 to 15.50
Stove Plate and Light Cast	10.50 to 11.00
Cast Borings	7.50 to 8.00

Cleveland.

CLEVELAND, OHIO, November 6, 1906.

Iron Ore.—Selling of Iron Ore for 1907 delivery started yesterday on a large scale. Buyers who have been in the market for a good while were permitted to cover their needs. The Ore Association has not been a factor in prices for the past three years, yet there seems to be a good deal of uniformity in the prevailing values, which are based largely on the supply and demand. It is realized that many new elements enter into the situation this year. One of them is the increased grasp of the Steel making concerns on the Ore deposits of the Lake Superior region, limiting therefore the number of strictly merchant mines. In addition there is some change in the intrinsic value of the Ore, due to a lessening of the output of the higher grades and increasing the output of those running lower in Iron. This has had the effect of changing somewhat the base analysis. Due to the variability of the analysis it is hardly permitted to make the same arbitrary quotations on base quality previously prevailing, but it is safe to say that the Bessemers have advanced about 75c. a ton, and the non-Bessemers about 50c. This brings the prices approximately to the following level: Old Range Bessemer, \$5, f.o.b. Lake Erie ports; Old Range non-Bessemer, \$4.20; Mesaba Bessemer, \$4.75, and Mesaba non-Bessemer, \$3.95. Sales have been made at more or less variations from these prices. All things being favorable, as they now appear, it is a safe prediction that the total yield for 1907 will exceed 40,000,000 tons, this estimate being made on the known increased demands from the strictly merchant furnaces, shown in the current buying. This result may be altered radically by the action of the Steel making companies in developing their own mines in 1907, which will of course depend largely upon the state of the Iron industry during the last half of next year—a factor which it is impossible even to estimate at this time. The movement of Ore for the month of October broke all records for that month. It amounted to 5,062,794 gross tons, compared with 4,257,009 tons for October last year. The movement to November 1 amounted to 33,238,835 tons, compared with 29,730,615 tons for the corresponding period a year ago.

Pig Iron.—The Pig Iron situation reached even a more acute stage during the past week, which has resulted in the predicted price of \$25 being reached on small individual transactions, while the general price for spot delivery is hovering close to that mark. The market is not altogether without Iron, of course, but the supply is so limited that it is extremely hard to get any considerable amounts. The needs of consumers are being met by shipping into this territory the surplus product of furnaces widely distributed as to location and also by the releasing of Iron which had been held in stock for speculative purposes, awaiting some such rise as this. The greatest shortage to the present time has been in No. 2 Iron. It is now beginning to be difficult to get lower grades. Some good sized sales of No. 2 have been made in this territory at \$24 at the furnace for spot shipment, while a few small sales for quick shipment have been made, as above stated, at \$25. The shortage is almost as great for first quarter delivery and practically the same prices apply there. For second quarter delivery the best price now quoted is \$21, Valley furnace. Southern producers are practically out of the market, quoting small lots of No. 2 for immediate shipment at \$20 to \$21, Birmingham, to which is added \$4.10 as a freight rate to make up the Cleveland price. First half material is selling at \$18 to \$18.50, Birmingham, for No. 2, the price varying with the

condition of the furnace as to orders. Owing to the prevailing shortage of Bessemer and Basic it is next to impossible to make an accurate statement of prices ruling there. It is asserted, however, that some small sales have been made for spot shipment at \$24 and \$25 at the furnace, while about the same prices rule on first quarter delivery. Second quarter material is selling from \$19 to \$19.50, Valley furnace.

Coke.—Coke is still strong, the car shortage having a considerable effect. The best grades of 72-hr. Foundry are selling on the basis of \$4 at oven, and Furnace Coke ranges from \$3.25 to \$3.50 at oven.

Finished Iron and Steel.—The market has been exceptionally strong and mills are falling further and further behind their contracts. Billets are extremely scarce. The shortage of Steel has compelled the closing, temporarily, of some of the finishing mills and further interruption of operations in this way may be expected. Forging Billets are selling from \$38 to \$41 at works for immediate shipment, the price depending on specifications and the size of the order. Sheets are still strong, and the buying is good, regardless of the rather stiff advance made a comparatively short time ago. Stock prices have been established on the higher level of 2.15c. for No. 10 Blue Annealed; 2.90c. for No. 28 One Pass Cold Rolled, and 3.90c. for No. 28 Galvanized. Bar Iron is strong, although it is declared not quite as strong as the prices on Scrap would indicate. Quotations vary, governed largely by freight rate considerations. It might be said that as a general thing the price rules at 1.70c. to 1.75c. at the mill. In Structural Shapes the demand from shipbuilders continues. A large passenger steamship company is about ready to place another vessel contract. Some consumers are being compelled by the shortage of material to buy in the East at premium prices when prompt deliveries are demanded. The premiums range from \$2 to \$4 a ton. Bar Steel is strong and is almost generally selling on the basis of 1.60c., Pittsburgh, for both Bessemer and Open Hearth.

Old Material.—There is a good deal of pressure on the Scrap market, due to the fact that prices have reached a level where there is comparatively little profit in the use of the material. However, the market has not yielded to the pressure, and prices remain about as they have been. The following are dealers' prices to the trade, f.o.b. Cleveland, per gross ton: Old Steel Rails, \$18 to \$19; Old Iron Rails, \$25.50 to \$26.50; Iron Car Axles, \$21.50 to \$22; Heavy Melting Steel, \$18 to \$19. Per net ton: Cast Borings, \$9.50 to \$10.50; No. 1 Busheling, \$15.50 to \$16; No. 1 Railroad Wrought, \$18 to \$18.50; No. 1 Cast, \$17; Iron and Steel Turnings and Drillings, \$12 to \$12.50.

Metal Market.

NEW YORK, November 7, 1906.

Pig Tin.—The statistics as compiled by C. Mayer, secretary of the New York Metal Exchange, were favorable to holders of the metal, as the total visible supply on October 31, 11,162 tons, was 1650 tons below that of the corresponding date last year and 1037 tons below that of a month ago. Stocks in the United States were 3260 tons, against 3020 tons at the end of September. Despite reports of poor business deliveries into consumption were large, amounting to 2600 tons. There has been a better trade at advancing prices. The high point of the week, 43.10c., was made on Monday; to-day a decline, following lower prices in London, brings the price to 42.50c. There has been a good inquiry for deliveries during the first quarter of next year from manufacturers of electrical supplies, but little actual business has resulted. It is also reported that the largest consumer has not covered its requirements for next year, but this seems to be improbable. Consumers generally are of the opinion that while the industrial activity and statistical position warrant somewhat higher prices, still it is believed that those prevailing to-day are much higher than conditions warrant. It is evident, however, that consumers will have to pay what London operators ask for some time to come, at least, in spite of the unusual amount of speculation now going on there. The London market closes lower to-day at £194 for spot and £195 for futures. The arrivals so far this month aggregate 1300 tons.

Copper.—The market, which has been marking time since the Bank of England's discount rate was advanced on October 18, causing a decline on that market, has renewed its activity, and prices are now mounting upward. The most interesting news of the week is that of the selling by the largest lake producer of between 10,000,000 and 20,000,000 lbs. of high grade metal for delivery early next year at the record price of 22½c. per lb. It is understood, however, that this sale is guaranteed against a decline. The market for Electrolytic Copper has been advancing in Europe since Saturday of last week, and the electrical industry in that country has been keeping up on an unprecedented scale. The London market has also advanced, and closes to-day at £99 for spot and £100 for futures, while Best Selected is held at £105, only £2 lower than the high level. Exports are

keeping up in excellent volume, the total from North Atlantic ports during October being 16,419 tons. The exports for the first 10 months of this year aggregate 171,045 tons, as against 208,510 tons, during the corresponding period in 1905. It is hard to find any spot Lake or Electrolytic, and the few sales which have been made the past month have been at special prices. Shipments can be had at 22½c. to 23c. for both Lake and Electrolytic. There is considerable complaint among producers about the scarcity of labor at the mines, and it is undoubtedly true that this one factor is seriously curtailing production.

Pig Lead.—There is a good demand at the old price of 5.90c. in both New York and St. Louis. The American Smelting & Refining Company continues to accept orders only at the price current on date of shipment. The price to govern outstanding contracts at 5.75c.

Spelter.—The market is very firm at 6.20c., St. Louis, and 6.30c., New York. There is a heavy demand for high grade brass mill Spelter.

Antimony.—Prices are unchanged at 25.50c. for Cookson's, 25c. for Hallett's and 24.25c. to 24.75c. for other brands.

Ferroalloys.—All lines are strong and several are higher. An unusually dry season and a small amount of rainfall throughout Europe have necessitated the closing down of many electrical works where electrolytical alloys are made and there is a consequent scarcity. The water has been so low this year that navigation on the Rhine and Elbe was stopped in October, whereas navigation usually can be carried on until the middle of December. There is a heavy inquiry for Ferrosilicon and 50 per cent. is quoted at \$104, f.o.b. New York and Philadelphia, and \$105.50, f.o.b. Boston and Baltimore; 75 per cent. is quoted at \$150, f.o.b. New York and Philadelphia, and \$151.50, f.o.b. Boston and Baltimore. Ferromanganese has been sold at \$80, Pittsburgh, but this quotation has been withdrawn. Ferrochrome is unchanged at a basis of \$150.

Nickel.—Prices are unchanged, but the demand is excellent at 45c. per lb. for ton lots, and 55c. to 60c. for small quantities.

Tin Plates.—The demand keeps up on an unusual scale; 100-lb. IC Bright Plates are being held at \$4.09, New York, and \$3.90, Pittsburgh, subject to the usual trade discounts.

Old Metals.—The market is steady, with a fair demand. Dealers' selling prices are as follows:

	Cents.
Copper, Heavy Cut and Crucible.....	21.00 to 21.50
Copper, Heavy and Wire.....	20.50 to 21.00
Copper, Light and Bottoms.....	18.75 to 19.00
Brass, Heavy.....	15.00 to 15.50
Brass, Light.....	12.00 to 12.50
Heavy Machine Composition.....	19.00 to 19.50
Clean Brass Turnings.....	13.75 to 14.25
Composition Turnings.....	16.75 to 17.25
Lead, Heavy.....	5.75
Tea Lead.....	5.50
Zinc Scrap.....	4.75

New York.

NEW YORK, November 7, 1906.

Pig Iron.—The most conspicuous feature of the Eastern Pig Iron markets is the stiffening on Basic Pig and the increased demand. As high as \$22, delivered, has been paid for spot Basic, and there is still an unsatisfied demand. There are two large inquiries in the market, one for deliveries from December to April, and the other from February to the end of the first half of 1907. There have been considerable sales of Foundry Iron, one consumer in Philadelphia taking an aggregate of 10,000 tons, several large melters in this district taking round lots, while good buying has originated in Connecticut and in the Boston districts. Considerable quantities of Scotch and Middlesbrough Iron have been sold. One very large inquiry which has gone abroad from this side, however, is not regarded as serious. Scotch No. 1 is now quoted at \$23 to \$23.50, ex-ship, while Middlesbrough No. 1 is quoted \$22 to \$22.50, and No. 3 \$21 to \$21.50, ex-ship, duty paid. To this must be added 60c. for delivery to cars. We quote for Northern Pig, for spot, \$25 to \$26 for No. 1 Foundry, \$24.50 to \$25 for No. 2 Foundry. For delivery during the first quarter we quote No. 2 Foundry \$23 to \$23.50, and for the second quarter \$22 to \$22.50. Southern Irons are selling at \$24 to \$24.50 for spot, No. 2 Foundry, \$22 to \$22.50 for the first quarter, and \$21.50 to \$22 for the second quarter.

Steel Rails.—The sales of the past week have aggregated about 15,000 tons, consisting of numerous small lots running from 500 to 1800 tons. Negotiations are under way for large quantities, among the prospective buyers being some important trolley lines desiring Rails for delivery next year. Electric roads are steadily becoming factors of consequence in the Rail trade. Standard Sections are unchanged at \$28 at mill.

Structural Material.—Railroad bridge work is now taking the lead in the Structural line. It is learned that the contracts let by the New York, New Haven & Hartford Railroad for its Harlem bridge construction, to be begun early in 1907, amount to 9300 tons, of which 3800 tons

went to Lewis F. Shoemaker & Co. and 3800 tons to the Pennsylvania, while a considerable part of the remainder was taken by the Riter-Conley Mfg. Company. The Lackawanna, the Rock Island, the South & Western and the Baltimore & Ohio are negotiating for quite a heavy tonnage in the aggregate. Numerous other inquiries are coming up. The building trade is inclined to be rather quiet, as usual at this season, but operations of considerable magnitude are expected to develop in the erection of industrial plants. The winter will be a very busy period with all Structural shops, as they have plenty of work to get out for spring delivery. The leading interest has its full capacity engaged for nine months. We quote on mill shipments for tidewater delivery as follows: Beams, Channels, Angles and Zees, 1.84½c.; Tees, 1.89½c.; Bulb Angles and Deck Beams, 1.99½c. On Beams 18 to 24 in. and on Angles over 6 in. the extra is 0.10c. Sales out of stock of material cut to length continue to be made at 2¼c. to 2½c.

Bars.—Sales agents report a fair degree of activity in the Bar Iron trade, and buyers able to shade 1.70c., Pittsburgh, or 1.84½c., tidewater, for Best Refined, may consider themselves fortunate. It had been expected that by this time the output of Eastern works would be considerably increased by the starting up of more mills which have been kept idle so long by strikes, but difficulty is being experienced in securing the necessary force to operate such mills, and the market therefore has had little relief in this respect. Steel Bars are strong, with a good general demand, a considerable part of the trade coming from those who use this material in reinforced concrete work. Mill shipments of Steel Bars are quoted at 1.64½c. to 1.84½c., New York, depending on time of delivery.

Plates.—The Eastern mills are so well supplied with work that orders not considered specially desirable are now charged \$2 per ton more than the regular price. The business of the week has been quite satisfactory, although no large orders were included, as far as could be ascertained. Quotations on general business are as follows at tidewater on carload shipments: Sheared Tank Plates, 1.74½c. to 1.84½c.; Flange Plates, 1.84½c. to 1.94½c.; Marine Plates, 2.14½c. to 2.24½c.; Firebox Plates, 2.24½c. to 2.60c., according to specifications.

Cast Iron Pipe.—The extraordinary condition of the Pipe trade is shown by the fact that some of the prominent foundries are now unable to promise deliveries before May 1 of next year. Of course all the foundries are not in this condition, but few can be found able to make shipments until well toward next spring. Orders have continued to come in rapidly, and in some instances buyers of Pipe who are in the habit of placing large orders for their season's requirements have contracted for twice the quantity they ever before used. Two small lettings are booked for this city to-day, one calling for 1800 tons and the other for 400 tons. The minimum price on 6-in. Pipe in carload lots, at tidewater, is now \$32.50 per net ton for future delivery.

Old Material.—Heavy Cast Scrap and Stove Plate are the principal materials receiving consideration at this time. Old Car Wheels are actively sought for as well as other classes of Cast Scrap. Prices are fully 25c. higher and stocks are extremely low, while the demand appears to be expanding. Cast Borings and Wrought Turnings are active, with prices a shade stronger. No. 1 Railroad Wrought is in good demand, with prices maintained. Heavy Melting Steel Scrap is in better inquiry, but the price does not seem to have advanced in the eastern Pennsylvania market. There is little likelihood that much tonnage will be shipped to that locality from this territory at present prices. Several large Steel mills in other sections have come into this market the past week, and sales have been made aggregating 10,000 to 15,000 tons of Heavy Melting Steel Scrap and Old Girder Rails. The prices realized on these sales were considerably higher than consumers in eastern Pennsylvania have been offering. Some nearby plants in New Jersey have purchased 3000 to 5000 tons, and a very large plant in New York State contracted for a good round tonnage, having found difficulty in covering its requirements. The Scrap situation is naturally strong, but indications are seen that prices will advance all along the line before the month is ended. Approximate prices for New York and vicinity per gross ton are as follows:

Old Iron Rails.....	\$24.50 to \$25.00
Relaying Rails.....	28.00 to 28.50
Old Steel Rails, rerolling lengths.....	18.50 to 19.00
Old Steel Rails, short pieces.....	16.25 to 16.75
Heavy Melting Steel Scrap.....	16.25 to 16.75
Standard Hammered Iron Car Axles.....	29.00 to 30.00
Old Steel Car Axles.....	22.00 to 22.50
No. 1 Railroad Wrought.....	21.00 to 21.50
Iron Track Scrap.....	18.00 to 18.50
No. 1 Yard Wrought, long.....	18.50 to 19.00
No. 1 Yard Wrought, short.....	18.00 to 18.50
Wrought Pipe.....	14.50 to 15.00
Light Iron.....	10.00 to 11.00
Cast Borings.....	10.00 to 11.00
Wrought Turnings.....	13.00 to 14.00
Old Car Wheels.....	20.00 to 20.50
No. 1 Machinery Cast.....	17.50 to 18.00
Stove Plate.....	14.00 to 14.50
Grate Bars.....	13.00 to 13.50
Malleable Cast.....	18.00 to 19.00

Iron and Industrial Stocks.

NEW YORK, November 7, 1906.

Transactions were limited and fluctuations narrow in the period running from Thursday of last week to Monday of this week, owing to election uncertainties. The market was well maintained, however, as a fairly confident feeling obtained that the result would not be injurious to property values. Tuesday, election day, was a strict holiday, all exchanges being closed. The market this morning showed no disposition to advance, contrary to expectation, and it is now possible that fear of dear money later in the year may keep stock operations rather quiet. Last transactions up to 1.30 p.m. to-day are reported at the following prices: Car & Foundry common 44, preferred 102; Locomotive common 74½, preferred 112½; Steel Foundries common 10, preferred 44½; Colorado Fuel 51½; Pressed Steel common 54½, preferred 98½; Railway Spring common 51½; Republic common 35½, preferred 97½; Sloss-Sheffield common 73½; Tennessee Coal 161; United States Cast Iron Pipe common 47½, preferred 90; United States Steel common 46½, preferred 105½, ex-dividend of 1¼ per cent.; Can common 6¼, preferred 54½.

The Trust Company of America, 135 Broadway, New York, and the Commonwealth Title Insurance & Trust Company, Twelfth and Chestnut streets, Philadelphia, are receiving subscriptions for the preferred stock of the Susquehanna Iron Products Company, organized under the laws of New Jersey for the purpose of acquiring the property of the Susquehanna Iron & Steel Company, located at Columbia, York, Marietta and Wrightsville, Pa. The new company will issue \$750,000 of 7 per cent. cumulative preferred stock for subscription at par, the par value of the shares being \$5. A bonus of one share of common stock will be given with each two shares of preferred stock subscribed and paid for. The company manufactures pig iron, skelp and wrought iron pipe. The character of the business on hand is shown by the fact that one order calls for 267 miles of wrought iron pipe.

Application has been made by the Chicago Pneumatic Tool Company to list its \$6,145,800 outstanding stock on the Pittsburgh Stock Exchange.

Dividends.—The Wheeling Steel & Iron Company, Wheeling, W. Va., has declared a quarterly dividend of 2 per cent.

Objection has been made to the drop by drop system of oiling, on the ground that it tends to a niggardliness in the supply of oil, and actually induces waste, since the oil is liable to be burned and practically useless after going once through the bearing. For surfaces working under severe conditions the forced oil system may be used to good advantage, but has the disadvantage of dependence upon a pump, which may fail at a critical moment. For most conditions the proper method is to use flooded lubrication from a gravity reservoir of sufficient capacity. This oil may be used repeatedly, does not get dirty, and efficiently carries away the heat generated by friction.

In a heating coil connection to an exhaust steam line which introduces no back pressure on the line, the radiator or heating coil supply is connected into the upper side of the exhaust pipe and the return or drip connection to the lower side of the exhaust, so that condensation will accumulate and form a water seal. This seal permits the condensation to overflow gradually into the exhaust line as it accumulates. It is plain that the combination acts as a vacuum system, the reduction in pressure being measured by the effective head of water in the discharge pipe. There should be an air cock on the heating coils at the drop connection for the removal of air.

Citizens of Milwaukee have completed the raising of a sum of \$250,000 for the erection of a public auditorium to take the place of the Exposition Building, which was burned to the ground in 1905. The city of Milwaukee will add a like sum to the fund, giving a total of \$500,000 for the erection of a great building which will be available for a diversity of uses. The building will be of fire-proof construction and will be pushed to as speedy a completion as possible.

Muck bar is in active demand in Philadelphia, first-class bars commanding \$34 to \$34.50 per gross ton.

Municipal Aid to Canadian Industries.

TORONTO, November 3, 1906.—An influence that has counted for much in the industrial upbuilding of this country is that of municipal aid. In one form or other municipalities have been important contributors to the promotion of many now flourishing manufactories. A familiar mode of giving the assistance of city, town or village is by means of the bonus. In Ontario, the bonus was abused, the result being that two kinds of ill effect were experienced. One was the unsettling of industry; the other was the starting up of enterprises inherently weak and therefore doomed to early collapse. The unsettling of industry was indicated in the many intimations given by established manufacturers that they would have to move their works to some other town if they did not receive some favor from the town in which they were situated—the favor being usually in the way of tax abatement, free sites for expansion, water front advantages, &c. The town had the alternative of complying with the demand or allowing a would be rival industrial center to draw the works away by means of a bonus.

Belleville attracted the Abbott Iron Works from Montreal by means of a liberal municipal subsidy. And the same case serves to illustrate the folly of giving town assistance to enterprises in which there are not all the other conditions necessary for success. Despite the large bonus, the plant which had been thus pulled up by the roots in one city failed to prove a paying concern in the other. It soon closed down, and until it fell into the hands of its present owners, which occurred recently, it remained closed. It is understood to be on a better footing in regard to capital than ever before. The 18-in. mill is running, and two others are to start shortly. The product of these rolling mills always gave satisfaction, and in the present era of large consumption they are fully assured of a good market.

Granting of Bonuses Restricted.

For the reasons mentioned—the unsettling of industry and the involvement of municipalities in debt that too often proved unproductive—the Ontario Legislature put restrictions on the bonusing practice. If a town in the province now wishes to give a cash aid to a local industry it must be empowered to do so by a special act. Not only in the sight of the law, but also in the popular regard, the cash bonus finds less favor than it formerly did in Ontario. Accordingly, even under special acts, the aid has lately been given quite frequently in some other way. Port Arthur, which may be regarded as the pioneer in the field of municipal ownership, is practically a partner in the Atikokan Iron Company, whose works are under construction in that town. Stock subscriptions, bond purchases and bond guarantees are more frequent ways of applying municipal aid than they formerly were. But the method most in use is that of providing a site free or at a nominal price and limiting the assessment to a specified low sum for a stipulated number of years.

There is scarcely a town in Canada that would refuse, purely on principle, to entertain a proposition of that kind. It is to be taken for granted of course that all towns would not be equally hospitable to projects for which such aid is sought and that in all places that amount to much industrially a promoter would have to satisfy the municipal authorities that he has adequate capital behind him and that economic conditions are in no particular adverse to his undertaking. Too often it has turned out that the capital was looked upon as a secondary matter, dependent upon the promoter's success in securing aid from the municipality. In such cases the aid of the town or city was sought as a means to interest capital. Generally speaking, however, the position and merits of a project have to be strong in themselves before it is now possible to induce any progressive municipality to commit itself to the venture.

Sydney Considering a Proposition.

At the present moment the municipal corporation of Sydney, N. S., has under consideration a proposal for the establishment of an important industry with the

city's aid. The industry projected is a rolling mill plant for the manufacture of bar steel, angle bars, tie plates, mine rails, railroad spikes, track bolts and other articles used in the construction of railroads. The plant is to cost \$400,000, and the company is to have a capital of \$1,000,000. The promoters are C. V. Wetmore and F. A. Crowell of Sydney and Mr. Derrick of Montreal. The city is asked to grant, first, a bonus of \$50,000 in the form of an issue of 4½ per cent. 30-year city bonds; second, exemption from taxation for 20 years; third, water at the minimum rate of three cents per thousand gallons. The proposition has been passed on by the City Council, which offered instead a \$30,000 bonus and tax exemption for 20 years. Though this was refused the negotiations have not been discontinued.

A special meeting of the Sydney Board of Trade was called on October 31, to deal with the company's application. It was largely attended, the business men present being unanimous as to the desirableness of the town's obtaining the industry. It was stated at this meeting that another town in the province was prepared to give \$50,000 bonus, 20 years' exemption from taxation, free water, free site and \$25,000 capital subscribed by the local merchants.

Two new manufacturing establishments will go to Port Arthur if the rate payers' vote on the terms is favorable. Another project before the Council of that town is one for the starting of wire works there. A site is among the concessions sought.

Welland, on the Welland Canal, has found the policy of granting municipal aid conducive to its growth, as besides the very extensive new cordage works brought from the United States it has secured a steel plant and may soon have another.

C. A. C. J.

In a recent paper Rear Admiral Melville (retired) states that forced draft dates back to Stephenson's Rocket, while its first use for marine purposes was by Robert L. Stevens on the Hudson River steamers prior to the American civil war. During that war Mr. Isherwood built a number of gunboats which used forced draft, but after that it fell into disuse for naval vessels until about 1882, when it was introduced into the English navy, and still later was applied in the mercantile service. In naval machinery forced draft has been of the greatest possible importance, because it has reduced boiler weights by almost one-half. In the navy the natural limitations as to space and weight prevent the use of forced draft with very much economy of fuel. It is obvious that if the rate of combustion is increased from 15 lb. of coal per hour per square foot of grate surface to 40 lb., there ought to be an attendant increase of heating surface. In the merchant service, or at least in certain classes of vessels in that service, it is possible to do this, and comparison has been made between the boilers of a merchant vessel called the Iona, and those of the American cruiser Baltimore. In the former there were 75 sq. ft. of heating surface to one of grate; in the latter the ratio was about 30 to 1. Had the boilers of the Baltimore been designed with the former ratio, their weight would have been almost double that of the entire machinery equipment of the ship as actually built.

Certain tests are used to detect loose rivets in a structural fabric. The impact of a hammer on the head of a loose rivet will produce a dull click, or the looseness may be detected by the very slight motion resulting. If the rivet head is in such a position that water can stand around it the very slightest vibration will be detected in the motion of the water. A tight rivet will cause the hammer to rebound freely, but if loose there is little recovery after impact. A finger laid against a rivet while struck with a hammer blow on the opposite end will detect any slight vibration due to looseness. The best way to detect looseness is to take a thin metal washer between the thumb and fore finger and hold it against the rivet head while the blow is struck by a small hammer at the opposite end. The slightest looseness can readily be detected by this means.

PERSONAL.

F. E. Porter, formerly of the Ensley Steel Works of the Tennessee Coal, Iron & Railroad Company, spent some time recently at the steel plant of the Cargo Fleet Iron Company, Limited, Middlesbrough, England, where the Talbot process is operated under the direction of the inventor, Benjamin Talbot. Mr. Porter is superintendent of the open hearth department of the New York State Steel Company, Buffalo, N. Y., which is installing two 200-ton Talbot furnaces at its new steel plant.

The late John C. Nulsen has been succeeded as president of the Missouri Malleable Iron Company, East St. Louis, Ill., by F. E. Nulsen, who is also general manager. A. J. Nulsen is now vice-president of the company, H. L. Baur, secretary; D. G. Rhoades, assistant general manager, and Henry Berkemeyer, treasurer.

George Stahlnecker will be the superintendent of the new blooming mill of the New York State Steel Company, Buffalo, N. Y.

Prof. Andrew Fleming West of Princeton University has declined the call of the Massachusetts Institute of Technology to succeed President Pritchett. It had been generally supposed that Professor West's acceptance was a foregone conclusion, but he was induced to remain at Princeton.

John C. Speirs, formerly with the Locomobile Company of America and with the Autocar Company, has been made superintendent of the works of the Corbin Motor Vehicle Company, New Britain, Conn.

Barton L. Keen has been appointed assistant to President R. B. Boland of the Birmingham Machine & Foundry Company, Birmingham, Ala. He assumed his duties November 1.

Ambrose Monell, president of the International Nickel Company, has been elected a director of the Liberty National Bank of New York.

Isaac Krewson has resigned as superintendent of the plant of the Penn Shovel Mfg. Company, Warren, Ohio. On retiring he was presented by the employees with a gold watch and chain and in turn tendered them a banquet.

Homer A. Wessel, Jr., president of the Cincinnati Railway Supply Company, Cincinnati, Ohio, has been appointed sales agent of the Hazard Mfg. Company, 71-73 West Adams street, Chicago, succeeding Robert A. Pect, who has resigned to engage in other business.

OBITUARY.

CARLETON WALWORTH NASON, president of the Nason Mfg. Company, New York, died from pneumonia, November 4, aged 57 years. He was a member of the American Society of Engineers, president of the Motor Cycle Club, and was a member of the New York and Atlantic yacht clubs, and of the Eastport Country Club. He was a widower, without children.

LE GRAND B. CANNON, retired banker and capitalist and an old resident of New York City, who for many years was prominently connected with iron enterprises, died at his summer home at Burlington, Vt., November 3, aged 91 years. He served in the Union Army for some time, first as major and subsequently as colonel, and then became an active worker in organizing, equipping and dispatching troops. He was for a long period vice-president of the Delaware & Hudson Canal Company and one of its largest stockholders. He took a deep interest in public affairs, was an active member of the City Club, vice-president of the American Protective Tariff League, one of the founders of the Union League Club, a member of the Army and Navy Club, the Loyal Legion, the Metropolitan Museum of Art and the National Academy of Design. He leaves three daughters, one of whom is the wife of Chester Griswold, formerly president of the Albany & Rensselaer Iron & Steel Company.

The Analysis of Fluorspar for Open Hearth Steel Works.

BY RANDOLPH BOLLING.*

The increasing use of fluorspar in connection with the basic open hearth process of making steel, owing to the great value obtained from it in reducing the viscosity of the slag bath and its removal of sulphur and phosphorus from steel, makes it a valuable mineral to the works operating with that process. The growing use has, of course, introduced a new material for the steel works' laboratory to analyze, and as usual in this class of chemical analysis, the quickest possible methods alone will answer the purpose, because the time required to make the determination is usually limited. The writer, in trying to devise a method, consulted some of the leading text books devoted to iron and steel analysis—namely, Blair's "Chemical Analysis of Iron" and Brearley and Ibbotson's "The Analysis of Steel Works Materials," which are supposed to cover the whole field, but no mention of fluorspar analysis could be found in either. The writer then devised and worked out the following scheme of analysis:

Method.

A 1-g. sample of the fluorspar, which had been well ground in an agate mortar, was heated in a 30-c. cm. platinum crucible with 10-c. cm. of strong sulphuric acid over a Bunsen burner, with an asbestos plate so as to reduce any tendency of spurling. After all fumes had ceased the crucible was allowed to cool, 5 g. of sodium carbonate were added and the crucible was brought to a red heat over a blast lamp. After complete fusion the mass was run up the sides and the crucible was finally placed in a 500-c. cm. porcelain casserole, with enough hydrochloric acid of 1.10 specific gravity to cover it, and evaporated to dryness, the crucible being removed, of course, after the fusion had dissolved. It was then taken up with strong hydrochloric acid and water was added to dilute the strong acid, so that it would not destroy the filter. It was then treated exactly in accordance with the standard scheme for limestone analysis. The silica was removed and determined by the first filtration, the iron and alumina were precipitated by ammonia, filtered and weighed, and then fused to estimate the iron. The filtrate from the iron and alumina contained all the lime, which was precipitated as usual by ammonium oxalate and determined by the standard permanganate solution. Magnesia is usually present in so small an amount as to be excluded from examination, but can, of course, be determined in the last filtrate. As calcium carbonate is sometimes found in foreign fluorspar a determination of CO₂ by the usual method as is used for limestone is made on a separate sample except that tartaric acid is used instead of mineral acid. In calculating the results the CO₂ is combined with enough lime to satisfy it for the CaCO₃ formula, and the remainder of the lime is calculated to calcium fluoride (CaF₂). A typical sample of English fluorspar gave the following result:

	Per cent.
Calcium fluoride.....	78.4
Calcium carbonate.....	8.1
Silica	4.2
Alumina	0.5
Oxide of iron.....	1.0

This scheme of analysis is quite satisfactory for a works laboratory. In the analysis of samples from prospecting the determination of fluorine directly, according to Fresenius, would be necessary when one is not sure of the source of the sample. This is quite intricate, and is rather difficult to carry out without special equipment. In the above method care must be taken to drive out all sulphuric acid in the initial treatment, by heating to a low red heat before fusing with sodium carbonate. Other elements accompany fluorspar, such as traces of phosphorus, manganese, sodium and potassium, but as these are merely of scientific interest their estimation would not be of any practical value and therefore can be omitted.

* Head chemist of the Nova Scotia Steel & Coal Company, Sydney Mines, Canada.

Ore Shipments Impeded.

DULUTH, MINN., November 3, 1906.—Thawing operations at iron ore shipping docks have begun, and shipments are delayed in consequence. There is not much frozen ore in cars, when they arrive at docks, but sufficient to impede unloading and to make ore run slowly into ships. Nevertheless, shipments to date have been enormous and far beyond the later expectations of traffic men. The Duluth, Missabe & Northern Railroad had moved over its line and docks, to November 1, a total of practically 10,000,000 gross tons, and Minnesota districts had forwarded about 22,600,000 tons. As there remain one month and a small part of another, the total for the year will reach 25,000,000 tons from the Mesaba and Vermillion ranges. Shipments from the head of the lake for month and season to date have been as follows, in gross tons:

	October.	Year to November.
Duluth, Missabe & Northern.....	1,626,828	9,965,217
Duluth & Iron Range.....	1,053,183	7,331,118
Great Northern.....	892,143	5,310,317
Gain over 1905.....	758,679	3,082,278

Not only is all the increase of this year coming off the Mesaba, but it is making up for a slight deficiency from the old ranges, for the total of the year will not be 3,000,000 tons over that of 1905.

The Great Northern road is preparing for double tracking its main ore line from the Mesaba range, in anticipation of a larger business as the result of its contract with the United States Steel Corporation. There will be some 35 miles of this new line. As it is doubtful if the Steel Corporation is able to turn over to the Great Northern any large tonnage for the coming year, it may be that this line will not be ready before 1908; indeed, it will probably be difficult to secure material and equipment before that time, should contracts be made now.

The Oliver Iron Mining Company

is buying a large amount of timber on the various ranges, in anticipation of its future requirements, and is considering still greater and rather sensational purchases. It has just bought, for something over \$500,000, a tract in northern Michigan belonging to the Cedar River Land Company in the counties of Delta, Dickinson, and Menominee, comprising 72,000 acres and containing a very large quantity of standing timber suitable for all mine purposes. There is also a large saw mill. This purchase makes the Oliver Company the second holder of timber lands in northern Michigan.

In addition to these large purchases the company is considering the acquirement of the largest block of pine yet standing in northeastern Minnesota, aside from the Weyerhaeuser tracts. It has recently made a careful examination of the entire standing timber of this part of Minnesota, and has found the total to be about 6,000,000,000 ft., which is being cut at the rate of more than 500,000,000 ft. per year. It is able to secure a block of some 400,000,000 or 500,000,000 ft. in this district, including two large sawmills and a standard gauge railroad running through a country that may be mineralized, and it may do so. It has been buying other timber tracts in the same region and already holds an enormous total. The various mining companies, especially the larger ones, are a most important factor in the timber market of the Northwest, and will be increasingly so as time passes. It will be but a short time before the northeastern portion of Minnesota is not a shipper of lumber to the Eastern market.

The Oliver Iron Mining Company is equipping its new steel shaft at the Chapin mine, the Ludington C. It has ordered the hoisting engines, one of which is to be for cage hoisting. It will be a single cylinder Corliss reversing, 30 x 60 in., running at 60 rev. per min. The drum is horizontal, 12 ft. diameter and 10 ft. face. The skip hoist is to be duplex reversing Corliss type, 34 x 72 in., running at 50 rev. per min. Its drum is similar to that of the cage hoist, and the capacity of the engine is a 10-ton load from 3000 ft. underground, the hoisting to be

performed in about one minute. It is intended to have this operation a model for economy and efficiency in every detail.

The Deepest Stripping Yet Undertaken.

On the Mesaba range will be that of the large Shenango mine of the Shenango Furnace Company. The company is seriously considering stripping this property, in order to make it an open pit mine by 1908. There is a thickness of 108 ft. of overburden above ore at this property, making the operation a very important one. The customary steam shovel operation will be carried on in this stripping. There are comparatively few mines on the Mesaba range with an overburden of more than 100 ft., and if stripping can be economically carried on there, few mines of sufficient thickness of ore will not be eventually stripped for open pit mining.

No. 8 shaft of the old Minnesota mine at Soudan, the first property to be opened in Minnesota, is to be deepened to 1200 ft. vertical. The mine will produce this year about 225,000 tons of hard ore, all of which comes from No. 8. It has been planning to open the Lee Hill deposit, which has been developed by drillwork. A few years ago the property was considered worked out, and was almost on the point of abandonment.

On the Old Ranges.

A new company has been organized to explore and develop the Barasa mine at Negaunee. A diamond drill is already at work. The mine has a deep shaft, and some drifting was done by former operators before the abandonment of the property several years ago. It is well located and should become a producing mine. In the same general district the old Imperial mine, west of Michigamme, is to be reopened by its owner, the Cleveland-Cliffs Iron Company, and the machinery is now being overhauled. It has two shafts, each about 200 ft. deep, and some drifting has been done. The ore so far found is rather lean, but similar to that of Ohio, Portland and others of the vicinity, which are to be active this winter.

Old Portland mine, near Michigamme, has been taken over by the interests represented by Rogers, Brown & Co., and will be explored this winter. It is claimed to have a large deposit of the customary lean, silicious ores of the district, running close to the surface and extending to a depth of at least 300 ft.

The firm of Oglebay, Norton & Co. has bought a one-third interest in the Empire property, near Cascade, and it will be developed on a large scale. The old Empire was reopened the past summer, when ore was found near the surface and covering a considerable area. A contract has been given for stripping and work begins this week. This stripping, of 25,000 yds., will all be over a portion of the ore body that comes within six feet of the surface, and it is expected that the mine will produce 300,000 tons next year of a 44 per cent. silicious Bessemer ore which must be crushed. A crusher will be installed at once.

The Penn Iron Mining Company has decided to sink another shaft this winter on its Briar Hill property, near Norway. As the shaft will be at least three-compartment and must go down 800 or 900 ft. it will be an operation of magnitude.

The Shenango interests are said to have cut a large body of ore in diamond drill exploration between Crystal Falls and Amasa, where they have been drilling for some time.

D. E. W.

The Lake ore carrier W. P. Snyder, owned by the Shenango Furnace Company, Pittsburgh, recently carried 380,262 bushels of Canadian grain from Two Harbors to Buffalo, N. Y. This cargo is equal to 10 trains of 38 cars each, and so far is a record-breaking cargo carried by one boat.

In October 21,500 tons of fabricated material were shipped from the Ambridge Works of the American Bridge Company at Ambridge, Pa., beating the best previous record for shipments from this plant in one month by over 5000 tons.

The Machinery Trade.

NEW YORK, November 7, 1906.

It is believed that never before in the machinery trade have the present conditions prevailed, especially as to the great demand for machinery, extended deliveries, the eagerness on the part of intending buyers to seek tools, and the disposition on the part of important companies to take second-hand machinery. It is about next to the impossible to get new tools, and dealers in this vicinity are clamoring for machines to sell to their customers. Even second-hand tools are snapped up by dealers, and in certain classes of tools the dealers are buying from one another when possible to fill their orders. One dealer a few days ago sold another dealer a \$5000 second-hand machine and since then has had several advantageous offers for the same tool. In these columns last week we noted that two Eastern factories had sold practically their entire output for 1907. On certain classes of tools others have experienced as large a demand. In this connection a most remarkable sale was made the past week, one that clearly shows the prosperous condition of trade and the premiums that some are willing to pay to secure even second-hand machines for early delivery. One of the important dealers in this city had on hand a slightly used and therefore second-hand automatic screw machine which is listed at \$575 by the manufacturer. The dealer had so many inquiries for the machine that he determined to ask for sealed bids, the highest bidder to get the machine. Many bids were received ranging from \$500 up, and the machine was sold at a little over \$1000, or \$425 above the price of a new machine of like size and make. While this transaction is certainly remarkable, there are undoubtedly others of smaller magnitude which are worthy of note as indicating the almost phenomenal demand for standard makes of tools. Probably no other method of selling a machine would so demonstrate the scarcity of tools on hand. It has heretofore been the custom of the buyers to ask bids on machines, but this transaction has reversed the usual rule, and we find those wishing to buy submitting bids to the seller. That this transaction will influence others to dispose of machines in the same manner is unlikely, but should they do it there is but little doubt that there would be some interesting developments.

There were a number of inquiries in the market the past week from foreign countries, including two lists of machine tools for shipment to Japan.

With the clearing up of the political troubles in Cuba has come to the country an increased demand for machinery, especially in the line of road making and grading equipment. Some agents who are purchasing for sugar plantations in the remote sections of the island who sent word during the martial strife to hold shipments have now asked that their orders be filled as rapidly as possible, and most of them have placed more orders. An engineer who is familiar with the conditions in Cuba and who recently met representative machinery men in that country, is authority for the statement that there will be increased activity in the machinery lines and prospects for a lively winter's trade with the island are excellent.

The demand for small castings and machine parts coming from manufacturers of artificial ice machinery indicate that during the next year the trade will get considerable business from that source. Most of the manufacturers of ice making apparatus seem to be having trouble in getting castings and other parts they have been in the habit of contracting for, and some of them have laid plans for enlarging and making all their requirements themselves. This will take some time, however, with deliveries as slow as they are at present, and it is highly probable that many of those who desire such machinery for use next summer will have considerable trouble getting it.

The Leather Belting Manufacturers' Association will meet on Wednesday, November 21, at the Fifth Avenue Hotel, New York, to hold its annual election of officers and Executive Committees and discuss affairs concerning the organization, including a number of changes in the constitution. There will be addresses by Samuel Fleischman of New York, who will speak on "The Advantage of Trade Association and Credit Co-operation;" Charles O. Alexander of Philadelphia, Pa., who will discuss the question of a time limit for delivery of railroad shipments, and Milton H. Cook, San Francisco, Cal., who will relate some experiences of the big fire. The session will begin at 2 o'clock, and an informal banquet will be served at 5.30.

Specifications for Machinery for Japan.

Frazar & Sale, Limited, 63 Wall Street, New York, has issued the following list of machine tools for shipment to

Kobe, Japan: One motor driven plate straightening rolls for plates 8-ft. wide, $\frac{5}{8}$ -in. thick; one hydraulic beam straightening machine, 24-in. stroke, 60 tons pressure; one motor driven edge planer to plane 32 ft. long; one motor driven edge planer to plane 35 ft. long; two motor driven planers to plane 16 ft. long, 48 in. wide; three spindle multiple drills, four three-spindle radial drills, two countersink drills, radius of arms 10 ft. 6 in. spindle diameter $2\frac{1}{2}$ in.; two compound hydraulic pumps, 1500 lb. pressure; one hydraulic accumulator, three motor driven punch and shear, two with depth of throat 24 in., one 49 in. to punch one and one-quarter holes in 1-in. plate, to shear 1-in. plate; one motor driven automatic spacing punch and shear, depth of throat 20 in., to punch $\frac{7}{8}$ -in. hole in $\frac{5}{8}$ -in. plate, to shear $\frac{5}{8}$ -in. plate; one motor driven double angle cutter to cut angles up to $8 \times 8 \times 1\frac{1}{8}$ in.; one motor driven cold saw cutting off machine to cut 24-in. I-beams; one hydraulic press 1500 lb. hydraulic pressure, six portable riveters with gap 3 ft. 6 in.; two portable riveters, gap 24 in.; two portable riveters, gap 12 in.; one motor driven cold saw cutting off machine to cut stock 18 in. square; one motor driven combined slotting and planing machine, with bed 14 ft. long, table diameter 8 ft.; one 72-in. motor driven planer to plane 20 ft. long; one 48-in. motor driven planer to plane 48 in. wide, 12 ft. long; one motor driven 14 ft. brake lathe, with 12-ft. bed; two motor driven pulley and flywheel turning lathes; one triple geared high speed cutting lathe, 8 ft. 3 in. between centers; one motor driven 16 ft. boring and turning mill; one double standard horizontal boring mill; two motor driven horizontal boring machines, two 8 ft. radial drills; one saw tooth grinding machine. All motors are to be direct current, 220 volts. This machinery is required for a girder shop and steel foundry.

The Pressprich & Son Company, New York, has sent out through David S. Hays, 11 Broadway, New York, the following list of machine tools for shipment to Japan: One motor driven 14-ft. brake lathe, two motor driven pulley and flywheel turning lathes, one 16×26 ft. boring and turning mill; one double standard horizontal boring machine, two horizontal boring machines.

The new shop to be erected at Miami, Fla., by the Florida East Coast Railroad will be 40×130 ft., to include a blacksmith shop, 40×50 ft.; machine shop, 40×60 ft., and wood shop, 20×40 ft. The shop will only be used temporarily, as it is being erected for extension work. It will be equipped with lathes, bolt cutter, radial drill presses, pipe cutter, shaper, power hack saw, band saw, circular saw, 1100-lb. steam hammer and other tools. Power will be furnished by an upright boiler and vertical engine.

The Michigan Screw Company, Detroit, Mich., recently incorporated for the manufacture of all parts that can be turned from steel, brass, bronze and aluminum bar on hand or automatic screw machines. The company has leased a plant with power which will be equipped with machines to take bar up to 5-in. diameter for making blanks, cups, combs, &c. A case hardening plant will be added which will be in charge of a man with long experience in carbonizing and hardening. The company is in the market for hand screw machines, automatic screw machines, nut machines, forge machines, bolt finishing machines and a boiler. R. E. Olds is president; D. C. Scott, vice-president; M. R. Potter, secretary and treasurer; Hugo B. Lundberg, formerly with the Chicago Screw Company and the Detroit Screw Company, superintendent, and W. M. Roberts sales manager.

We are given to understand that the Public Service Corporation will soon come into the market for the equipment for a repair shop now in course of construction at Camden, N. J. The buildings, which are being erected by Henderson & Co., Limited, Philadelphia, Pa., will be of brick construction, and each of them will be one and a half stories high. The car barn will be 137×321 ft. and the repair shop 138×255 ft. The equipment for the shop will consist of one or two large lathes, drill presses and a general assortment of machine tools. There is some machinery at an old repair shop at Camden which will be utilized, but it is understood that considerable more than that will be bought. The buying for the company is generally done from its office at 207 Market street, Newark, N. J.

An addition is being made to the plant of D. H. Burrell & Co., manufacturers of engines, boilers and creamery machinery, at Little Falls, N. Y. The company will have a five-story and basement addition, 118×120 ft., and most of the machinery required for equipping it will be purchased from its Little Falls office. The heating and power plant details are being arranged by E. S. Farwell, consulting engineer, at 309 Broadway, New York, and the plant will consist of 150 hp. of boilers and a corresponding engine and generator. The boiler has been arranged for and the rest of the equipment will be purchased soon.

W. L. Reid, Buffalo, N. Y., is purchasing power plant equipment for the Susquehanna Hardware Mfg. Company, Buffalo, which is having built a structure about 50×360 ft. The power plant equipment will consist of a 125-hp. boiler and 100-hp. engine, together with pumps, feed water heater and other power equipment.

E. R. Knowles, 63 Park row, New York, is consulting

engineer for the firm of T. E. Hergert, metal ornament maker, 384 Second avenue, which is building a plant on East Fifty-third street. Mr. Knowles is preparing plans for power equipment and other engineering details.

New England Machinery Market.

WORCESTER, MASS., November 5, 1906.

Some of the machine tool builders report a slacking up of orders, due not to advanced prices, but wholly to the inability to give anywhere near early delivery. Inquiries are numerous, perhaps even more so than they have been, and many of them are made during personal visits to the shops. In most instances orders would result immediately were it not for the long time that would ensue before machines would be available for the customer's purposes. As it is the volume of new business probably equals shop capacities, so that deliveries do not promise to grow better, though, unless things change, they should become no worse, taking the general rule. Certain works have actually got beyond the taking of any orders on certain machines, for deliveries on some tools run into the summer of 1908, nearly two years from now. Most manufacturers do not care to plan for so remote a future, and consequently they will not buy. As already stated prices do not seem to count for anything in the intercourse of prospective customers and the manufacturers, though occasionally a dealer tells of some incident where a buyer complains vigorously because prices have advanced again. Usually in such cases the customer has canceled the original order, and when he places it again he finds a difference of \$50 or so, which is not pleasant from his point of view. Or the instance may be one where the customer decides too late to make a purchase, the price having gone up in the meantime.

A number of machine tool builders have notified their dealers that hereafter their discount will be 12½ instead of 10 per cent. This is what the dealers have been asking for some time, and the matter has been taken up by their national association and by that of the National Machine Tool Builders' Association, but with no concerted result. The dealers are hoping that the beginning already made by some of the manufacturers will have as its outcome a general change to the 12½ per cent. basis.

The steam pump manufacturers are very busy indeed, their condition being about the same as that which prevails generally in all machinery lines. This applies not only to the large companies, but to the smaller steam pump establishments. These latter manufacturers do not venture far into the field of standard types of pumps, but confine themselves for the most part to pumps for more or less special purposes, in which they are better able to compete with the larger companies than in standard pumps, where production in large lots necessarily greatly decreases costs, as compared to that at which the small companies can do the work. The field of the steam pump has not materially increased during recent years, the manufacturers state. The demand comes from the same class of customers, but in much larger volume.

Power plant equipment in all its diversified branches promises to be in strong demand in New England in 1907. Many power plants will be built and others enlarged by electric railroads, the textile mills, the metal industries and through the widely diversified list of industries which exist in New England. The steam turbine will probably maintain its increase in popularity, for it is being talked in considering the plans of a large number of power stations, including some where the contemplated horsepower is not large.

Many new garages are being planned for next season's business, and inquiries for complete machine tool equipments are not infrequent. The garage does not necessarily require the most expensive tools, but owners have learned oftentimes by experience that workout second-hand machinery does not constitute a profitable investment, for the requirements in repairing parts of the automobile are not of the rough and ready order.

Hill, Clarke & Co., Boston, are to make extensive changes in their large store at Oliver and Purchase streets. The offices which are now located in the street corner will be moved back on the Purchase street side, releasing valuable window space for show purposes, and at the same time providing better office facilities. The changes will constitute a very considerable improvement to the premises.

The Fort Hill Bronze Mfg. Company, 130 Oliver street, Boston, is to erect a new brass foundry, which will give a very much larger capacity than the present foundry. The new building will be 40 x 100 ft., one story, with monitor roof. The company operates seven furnaces at the present time, and the new building will provide a capacity of 17 furnaces. The stack will be large enough to permit of as many more furnaces by the extension of the building, the chimney coming at the one end of the structure. A jib crane will be

required, information concerning which should be obtained from Frank T. Eskrigge, 161 Devonshire street, the engineer who is designing the foundry. Other requirements will be a gas engine and the new furnaces.

Another new automobile manufacturing company now organizing is the Bay State Auto Company, 112 Norway street, Boston.

The Stamford Motor Company, Stamford, Conn., manufacturer of marine and stationary gasoline engines, is to build an extension of its present shop, 50 x 125 ft. and one and a half stories.

The Fitchburg Horn Goods Company, Fitchburg, Mass., may require a new steam engine to provide additional power made necessary by a new manufacturing building, which will be 35 x 100 ft., two stories and basement. An elevator, shafting, hangers, &c., will also be purchased.

The Norwalk Hardware Company, Norwalk, Conn., has extended its plant by the purchase of the machine shops of Charles F. Hendee and William Gimrod. The company has located its general repair and machine business in the building formerly occupied by Mr. Hendee, and desires to receive catalogues and discounts on lathes, shapers and other machines for general repair and light machine work.

The Wilkinson Turbine Company, the organization of which was given in this column last week, makes the announcement that it is prepared to enter the trade with its steam turbine, preparations having been completed for its building at the Corliss engine works, Providence, R. I. The company will furnish the Wilkinson turbine in all sizes. Tests have been completed, demonstrating to the engineers of the company that the turbine has been developed to the point of commercial efficiency. The main office of the company will be at Providence, and it is planned to open a New York office in the near future, and offices in other cities as the demand for the turbine shall grow.

Machinery circles are interested in the plans of the Navy Department to establish a new dry dock somewhere between New York and Boston, preferably at the coaling station at Portsmouth, on Narragansett Bay. If a great dry dock capable of receiving a first class battleship is constructed there must of necessity be repair shops auxiliary to it, although, if the plan is carried through to the point of securing the necessary appropriation from Congress, it will be a long time before machinery would be purchased; nevertheless it will mean that a considerable amount of future business will be in sight, which is always important.

The Warren Steam Pump Company, Warren, Mass., has been awarded the contract for two duplex pumps of unusual capacity for use by one of the contractors employed on the East River Tunnel, New York. These pumps will be operated by compressed air and will deliver water at a pressure of 5000 lb. to the square inch. This entails the use of a 3-in. plunger and a 24-in. steam cylinder. The pumps will be used in forcing forward the shield as the tunnel progresses.

The Lees & Jackson Company, 902 Chapel street, New Haven, Conn., mechanical and contracting engineers, has absorbed the Standard Engineering Company of that city, and G. Edward Osborn of the Standard Company will hereafter be identified with the Lees & Jackson Company. In addition to the business as engineers the company acts as manufacturers' agent in Connecticut for steam engines, boilers, gas producers, gas engines and a full line of steam specialties, such as the Burrows regulators, Foster grates and Swartwout steam separators.

Philadelphia Machinery Market.

PHILADELPHIA, PA., November 5, 1906.

Sales of machinery and tools the past week have been generally satisfactory. Orders, while not individually large, have been in good number and cover fairly well the full range of the medium and smaller sizes of tools. Here and there a sale of some of the heavier standard tools as well as heavy special tools is to be noted, but the number is not great.

Inquiries are about as plentiful as they have been for some months, but the largest proportion are for small lots of tools. The trade does not look forward to extensive buying during the remainder of the year. Where large equipments are required it is thought that the tendency to purchase will be deferred until after the turn of the year. At the same time some probable buyers who, under ordinary conditions would place their order for a number of tools in one lot, are breaking up not only their orders, but even their inquiries, so as to get the best expression as to the prospective deliveries that can be made by the different manufacturers, and eventually place their orders with those from whom they can get the best delivery.

But little new business is expected by the trade from the local railroad companies, particularly in the way of general

equipment purchases. Some scattered buying will no doubt be done for such tools as may be wanted for the earliest possible shipment, but no heavy purchases are anticipated in the near future.

Manufacturers in practically every branch of the trade have more business than they can satisfactorily handle. Orders continue to come in, notwithstanding the extended dates of delivery and in some cases advances in prices. Plants are being operated at their fullest capacity, and every effort is being made to push work ahead. Several factors, however, operate against the immediate possibility of increased production. Raw materials particularly are hard to get, and in some lines deliveries are much delayed. Mechanics are scarce, and in many cases those employed have been working overtime so long that it is impossible to get any increased production from that source.

There is no perceptible change in the foreign demand. Business continues to be offered from various sources, but with builders of machine tools so well booked ahead little attention is paid to such inquiries requiring early deliveries. Some good orders for special machine tools have been booked by several manufacturers, while the business transacted in power transmission and other specialties for foreign account has been quite up to the average.

Second-hand machinery and machine tools continue in active demand. Tools taken in trade or such tools as are obtained by dealers, which are at all desirable or in fairly good condition find ready sale, and will no doubt so continue until manufacturers of new tools are able to make better deliveries on new equipment.

The boiler and engine trade is only fairly active; a number of good deals are under consideration, but are slow in closing up. The demand recently has been more generally confined to the medium and smaller horsepower, although several propositions for high power equipment are said to be in sight.

The volume of business offered the foundries continues large. Steel casting plants have their capacities almost fully taken and early deliveries are hard to get. Gray iron plants are equally busy, but in some cases deliveries are more prompt, although many of the tool builders complain of the inability to get good deliveries on machinery castings.

Dodge & Day, engineers, report a good demand for new and re-equipment of old manufacturing plants, and are particularly busy on a large amount of such work in varied classes. Among others on which they are engaged is a new shop for the Bridgeport Brass Company, Bridgeport, Conn., which includes both the building and equipment. They are also engaged in the construction of two manufacturing buildings for the S. L. Allen Company of this city, also an additional power plant, including one boiler and generating set. They will also completely rearrange the company's hammer shop. Considerable equipment will probably be required for the new manufacturing buildings for this company, but it has not yet been decided as to what that will include.

The Borough of Merchantville, N. J., will construct a system of sanitary sewers and a sewage disposal plant according to plans prepared by the City Waste Disposal Company, 156 Fifth avenue, New York. There will be required about 9 miles of vitrified pipe sewers, 8 to 10 in.; 3350 ft. of iron pipe sewers, siphons and force mains, two small pumping stations complete, and filter plant and materials for the disposal plant. Bids will be received until November 10 and plans can be obtained from the engineers or from the City Clerk, Merchantville, N. J.

The American Die & Tool Company, Reading, Pa., is making several additions to its plant, including a new hardening house, which when completed will increase its production of punches, dies and reamers fully 100 per cent. This company is busy in every department and orders are being received in good number. A new line of patented punches for boiler plate work is now being placed on the market, as is also a new surface grinder and a cold saw cutting-off machine.

The American Pulley Company notes a good demand both from foreign and domestic sources. All departments are busy and several needed additions, including a fireproof storage house for dies and an addition to the machine shop, are being made. No additional equipment will, however, be required for the latter. Recent shipments include two carloads of pulleys to London and one shipment of somewhat smaller size to Australia. Domestic shipments have been heavy and include carload lots for points in the South and on the Pacific Coast.

The Birdsboro Steel Foundry & Machine Company advises us that shipments in October of finished products, as well as iron and steel castings in the rough, exceeded those of any previous month in the history of the company. Orders booked recently have been large, including cement machinery, marine engine cylinders, blast furnace and open hearth castings and finished mill equipment. Among some of the recent deliveries made may be mentioned three large hydraulic accumulators, which included castings of extra large size, Wagner cold saws, belt lacing machines and prospecting drill outfits. To meet the constantly increasing demand this company has practically closed contracts for a

number of new machine tools. Work will also shortly be started on a new power house, twice the area of the present one. In this will be installed a 500-hp. engine directly connected to a 300-kw. generator, also another air compressor of the latest design.

The Royersford Foundry & Machine Company, Royersford, Pa., is very busy in all departments. Inquiries for punches and shearing machines have never before been as heavy, and the resulting orders are quite satisfactory, and, notwithstanding that the plant is being regularly operated 13 hours a day, more or less difficulty is experienced in filling orders promptly. Among recent sales may be mentioned eight punches and shearing machines to Manning, Maxwell & Moore, two of these machines having already been shipped to the South Baltimore Car & Foundry Company, Curtis Bay, Md. In addition four punches and shears have been shipped to Kasper & Koetzle, Brooklyn, N. Y.; one to E. F. Schlichter, Norristown, Pa.; two to the Fairbanks Company, New York; one to the Wayne Iron Works, Wayne, Pa., and one to W. T. Kirk & Co., Plainfield, N. J.

The R. S. Newbold & Son Company, Norristown, Pa., is doubling the size of its erecting shop and making a 50-ft. extension to the foundry. These improvements became necessary to handle largely increasing business, as with present facilities the company has been unable to meet the delivery requirements of its trade. Some of the work in hand includes 12 producers and a large smoke flue for John A. Roebblings' Sons Company, four Tropenas converters for Powell & Colne, New York; one 9 x 125 ft. stack and breeching for the B. F. Sturtevant Company, one 6 x 125 ft. stack for the Alan Wood Company, six washer punching machines and one motor driven circle cutting shear, with a capacity of 60 x $\frac{1}{2}$ in. circles, for the American Steel & Wire Company; 12 tuyere stocks, eight boiler gas valves and all the stove gas valves, hot and cold blast valves, chimney valves, cleaning doors, &c., for the Hamilton Iron & Steel Company of Canada; one 11-ft. plate straightening machine for the Central Iron & Steel Company, and one 80,000-lb. rotary squeezer, with 50-in. drum, for the Longmead Iron Company.

The Pennsylvania Iron Works Company, Fiftieth street and Lancaster avenue, which recently sold its property, including buildings, to the Standard Roller Bearing Company, of this city, has purchased 15 acres of river front property at Eddystone, Pa., some 13 miles from this city, on which it will erect a plant for the manufacture of marine gas engines from 10 to 300 hp. It will begin operations at an early date with the erection of a structural steel and corrugated iron shop, 735 ft. long and 65 ft. wide, with an ell, 50 x 65 ft. When this is completed the machinery which is being used at the present plant will be transferred to the new works, and while additional machinery will be required to complete the equipment of the new and larger shops it is as yet undecided as to what the new requirements will be.

Government Purchases.

WASHINGTON, D. C., November 5, 1906.

The Isthmian Canal Commission will soon ask bids for two duplex steam pumps.

Proposals will be asked within the next few days for the mechanical equipment for the power plant for the United States Capitol.

The Isthmian Canal Commission will receive bids until December 11, Circular No. 338, for two suction dredges.

The following bids were opened October 30 for supplies for the navy yards:

Bidder 2, American Woodworking Machinery Company, New York; 13, Alliance Machine Company, Alliance, Ohio; 24, Brooklyn Forge & Supply Company, New York; 26, Berger-Carter Company, San Francisco, Cal.; 27, Brown & Sharpe Mfg. Company, Providence, R. I.; 30, Geo. F. Blake Mfg. Company, New York; 39, C. & C. Electric Company, New York; 40, Chicago Pneumatic Tool Company, New York; 42, Cleveland Crane & Car Company, Wycliffe, Ohio; 45, Crocker-Wheeler Company, Ampere, N. J.; 49, Chandler & Farquhar Company, Boston, Mass.; 54, Case Mfg. Company, Columbus, Ohio; 60, M. T. Davidson, Brooklyn, N. Y.; 63, Drew Machinery Agency, Manchester, N. H.; 64, Davis Mfg. Company, Milwaukee, Wis.; 73, Fox Machine Company, Grand Rapids, Mich.; 78, Fairbanks Company, Baltimore, Md.; 80, General Electric Company, Schenectady, N. Y.; 85, R. W. Geldart, New York; 96, Henshaw-Buckley & Co., San Francisco, Cal.; 97, Handlan & Buck Mfg. Company, St. Louis, Mo.; 99, Hirsey-Wolf Machine Company, Cincinnati, Ohio; 101, Harron, Rickard & McCone, San Francisco, Cal.; 103, Halliday Machinery Company, Seattle, Wash.; 107, A. E. Hoermann, New York; 108, Independent Pneumatic Tool Company, Chicago, Ill.; 110, Ingersoll-Rand Company, New York; 132, Lucas Machine Tool Company, Cleveland, Ohio; 133, Lincoln Electric Mfg. Company, Cleveland, Ohio; 144, Manhattan Supply Company, New York; 145, Manning, Maxwell & Moore, New York; 150, Northern Elec-

trical Mfg. Company, Madison, Wis.; 153, North Penn Iron Company, Philadelphia, Pa.; 156, Niles-Bement-Pond Company, New York; 162, Oliver Machinery Company, Grand Rapids, Mich.; 163, Pawling & Harnischfeger, Milwaukee, Wis.; 166, Pratt & Whitney Company, Hartford, Conn.; 172, Prentiss Tool & Supply Company, New York; 175, Quincy, Manchester, Sargent Company, Plainfield, N. J.; 178, Ricketts Engineering Company, Washington; 179, H. A. Rogers Company, New York; 191, William Sellers & Co., Incorporated, Philadelphia, Pa.; 199, Sprague Electric Company, New York; 209, Sherman-Brown-Clements Company, New York; 221, H. B. Underwood & Co., Philadelphia, Pa.; 222, Universal Supply Company, New York; 231, Westinghouse Electric & Mfg. Company, Baltimore, Md.; 236, Western Electric Company, New York; 237, Pacific Tool & Supply Company, San Francisco, Cal.

Schedule No. 161.

Class 1. One toolroom lathe—Bidder 101, \$1119; 178, \$899; 237, \$950.

Schedule No. 162.

Class 11. One electric overhead traveling crane—Bidder 13, \$5935; 42, \$6900; 54, \$6200; 101, \$7100; 145, \$6715; 153, \$5803; 156, \$1635; 163, \$5000.

Schedule No. 179.

Class 21. One pattern makers' lathe—Bidder 73, \$285 and \$483; 145, \$487; 162, \$516; 172, \$500.

Class 22. One pattern makers' lathe—Bidder 73, \$350 and \$573; 145, \$590; 162, \$620; 172, \$600.

Class 23. One full universal radial drill—Bidder 78, \$1375; 145, \$1595; 156, \$1360; 178, \$1885.

Class 24. One slotting machine—Bidder 78, \$1050; 145, \$1065; 156, \$925; 178, \$1100.

Schedule No. 180.

Class 31. One band saw machine—Bidder 49, \$120; 63, \$117.50; 73, \$163.80; 97, \$225; 162, \$305 and \$252.

Schedule No. 181.

Class 41. Two gibbed carriage engine lathes—Bidder 145, \$1700; 166, \$1740.

Class 42. One tool makers' engine lathe—Bidder 145, \$530; 166, \$527.

Class 43. One triple geared engine lathe—Bidder 145, \$2955 and \$2985; 156, \$3180; 172, \$3687; 178, \$3220.

Class 44. Two engine lathes—Bidder 145, \$3870, \$4210 and \$3350; 156, \$3824 and \$3424; 172, \$4096; 178, \$3780.

Class 45. One wood turning speed lathe—Bidder 73, \$121; 145, \$87; 162, \$86.50.

Class 46. Two Hendey & Norton lathes—Bidder 145, \$4240; 156, \$3126; 172, \$3860; 178, \$4945.

Class 47. One swing patent head screw cutting engine lathe—Bidder 78, \$1480; 145, \$1060; 156, \$1100; 178, \$1159.

Class 48. One drill grinding machine—Bidder 191, \$390.

Class 49. One universal tool grinding machine—Bidder 27, \$972 and \$979; 172, \$825.

Class 50. One portable electrically driven bench grinder—Bidder 24, \$50; 85, \$50; 99, \$53.80; 150, \$200; 209, \$50.

Class 52. One motor driven horizontal boring, drilling and milling machine—Bidder 132, \$3260; 156, \$3492; 172, \$3020.

Class 53. One motor driven portable cylinder boring machine—Bidder 97, \$499; 172, \$524; 175, \$539; 221, \$568.

Class 54. One centering machine—Bidder 166, \$140; 172, \$114.

Class 55. One double disk sandpapering machine—Bidder 97, \$675; 162, \$575; 222, \$449.

Class 56. One universal tilting table double arbor saw bench—Bidder 2, \$570; 162, \$723; 172, \$656.

Class 57. One motor driven universal power sheet metal cutter—Bidder 64, \$375.

Schedule No. 188.

Class 62. One twist drill grinder and one cutter grinder—Bidder 103, \$243.75.

Schedule No. 191.

Class 97. Two automatic motor hoists—Bidder 26, \$478; 40, \$440; 101, \$477.60; 107, \$440; 110, \$526.

Class 98. One pipe bending machine—Bidder 96, \$239; 97, \$240; 101, \$278.90; 107, \$750; 145, \$238.75; 179, \$239.15.

Schedule No. 192.

Class 101. Ten vertical high pressure Dow pumps—Bidder 30, \$978; 60, \$840; 96, \$1200; 101, \$1305.

Schedule No. 205.

Class 184. Two variable speed motors—Bidder 80, \$379; 133, \$548.

Schedule No. 206.

Class 222. One 15-hp. semi-enclosed motor—Bidder 39, \$329; 45, \$370; 80, \$324; 150, \$369; 199, \$343; 231, \$320.

Class 224. A number of portable electric grinders and drills—Bidder 24, \$1392; 40, \$1232; 85, \$1319.20; 99, \$1482; 144, \$1369; 145, \$1294; 209, \$1307; 236, \$1448.

Class 224. A quantity of pneumatic drills and hammers—bidder 40, \$2549.50; 108, \$2355; 110, \$292650.

Under bids opened September 11 for machinery for the navy yards Harro, Ricard & McComb, San Francisco, Cal.,

have been awarded class 2, one band saw machine, \$267.10; Manning, Maxwell & Moore, New York, class 3, one 4000-lb. steam hammer, \$4540.

The following awards have been made for supplies for the navy yards, bids for which were opened October 9:

The Niles-Bement-Pond Company, New York, class 121, one universal milling machine, \$1870; class 122, one vertical drilling machine, \$67.65; class 124, one horizontal boring and drilling machine, \$2820; class 125, one vertical boring and turning mill, \$2625; class 126, one 1000-lb. single frame steam hammer, \$1020; class 127, one pipe cutting and threading machine, \$498; class 131, one slotting machine, \$2510.

The Ricketts Engineering Company, Washington, D. C., class 123, one universal radial drilling machine, \$1650; class 132, one motor driven screw cutting lathe, \$800.

Manning, Maxwell & Moore, New York, class 130, one double angle shearing machine, \$5620; class 213, five pipe cutters and 76 pipe wrenches, \$81.29.

The Garvin Machine Company, New York, class 128, one engine lathe, \$3350.

Vermilye & Power, New York, class 134, one double cylinder drum hoisting engine, \$849.

The General Electric Company, Schenectady, N. Y., class 263, one electric motor, &c., \$375.

The Automatic Switch Company, New York, class 264, one automatic motor starter, \$108.

The following awards have been made for supplies for the navy yards, under bids opened October 23:

The George F. Blake Mfg. Company, New York, class 22, one vertical duplex steam pump, \$45.

The Chicago Pneumatic Company, New York, class 93, six nonreversible air drills, \$300.

Under bids opened October 27, Circular No. 334, for machinery for the Isthmian Canal Commission, Fox Bros. & Co., New York, have been awarded class 10, one twist drill grinder and five carborundum wheels, \$100.77.

Trade Publications.

Electrical Apparatus.—General Electric Company, Schenectady, N. Y. Bulletins and flyers. Bulletin No. 4443 deals with the Sprague-General Electric multiple unit control for alternating and direct current operation; No. 4446, superseding 4405, with starting compensators for alternating current motors. The general construction of these is explained and tables of dimensions, in inches, of the type CR, three-phase, and the type CR, quarter-phase, starting compensators and fuse bases is given. Bulletin No. 4447 pertains to low voltage three-phase generator and feeder panels, which are suited to the prevailing voltages of 240, 480 and 600, and for controlling generators ranging from 22 to 400 kw. capacity, with feeder panels for circuits of from 20 to 320 amperes capacity. Bulletin No. 4449 deals with potential and synchronizing plug switches, which are claimed to be more convenient in operation and reliable of contact and connection than other switches. Bulletin No. 4450 lists the parts of the GE-80-A railroad motor. Flyer No. 2192 deals with the type SA motor starting rheostats, with no voltage release. These are for use with shunt or compound wound motors. Another flyer illustrates the various forms of incandescent lamp bases for Edison lamps.

Electrical Apparatus.—Stanley-G. I. Electric Mfg. Company, Pittsfield, Mass. Bulletins and circulars. Bulletin No. 611, superseding No. 67, is devoted to the G. I. snap switch. Circular No. 784 deals with the G. I. incandescent lamps suitable for all circuits and conditions. Long life and high efficiency is claimed for these lamps. Circular No. 781 pertains to the G. I. type "J" primary fuse box or transformer cutout. Another circular illustrates various sizes of small motors.

Engines.—Rollins Engine Company, 29 Mason street, Nashua, N. H. Bulletin No. 15. Size 6 x 9 in.; pages 24. Describes and illustrates the model No. 2 Rollins engine, which are claimed to be durable, efficient and of noiseless operation. Parts of the engines are dealt with separately, and a table of the horsepower per pound mean effective pressure is appended.

Contractors' Supplies.—Steel City Electric Company, Third street and Penn avenue, Pittsburgh, Pa. Pamphlet. Illustrates and lists Fullman lock nuts, Fullman star bushings, Fullman brass bushings, Fullman watertight floor outlets, universal insulator supports, beam straps, Thompson reaming device and hand conduit benders.

Feed Water Heaters and Purifiers.—Warren Webster & Co., Camden, N. J. Part 1, Appendix VI, of the general catalogue. Illustrates and describes the class "ED" Webster star-vacuum feed water heater, purifier, filter and receiver. These range in capacity from 500 to 5000 hp. The operation is very clearly brought out, and also the special features claimed for the heaters. The company is also distributing a reprint from the *Street Railway Journal* of July 22, 1905, entitled "Some Phases of the Feed Water Heater Problem," by Walter E. Harrington.

Machinery.—A. B. Farquhar Company, Limited, York, Pa. 1906 price-list and telegraph code of engines, boilers, saw mill and threshing machinery made by the company.

Illinois Steel Company Records.

CHICAGO, ILL., November 6, 1906.—(By Telegraph.)—During October the Illinois Steel Company eclipsed all previous record-breaking achievements, having established 40 high records in the 27 working days of the month in all departments, including the cement works, as compared with 13 in the same period last year. The output of the new structural mill, which has been in operation less than a year, was especially noteworthy, having reached a total of 18,269 tons for the month, and during the week ending October 13 5087 tons were produced. The production records for October follow:

South Works, all blast furnaces, best previous record, September, 1906, 115,825 tons; October, 120,754 tons. Total ingots, all works, best previous record, 192,385 tons, in September, 1906; October, 212,547 tons. Open hearth No. 2, 24 hours, best previous record, January 30, 1906, 2137 tons; October, 2449 tons; same, week ending September 1, 1906, 9539 tons; week ending October 6, 11,516 tons; week ending October 13, 12,433 tons; same, month of August, 1906, 37,586 tons; October, 1906, 53,473 tons. Best month's record for individual open hearth furnace, No. 17, 5001 tons. Blooming mill, 12 hours, September 29, 1906, 770 tons; October 9, 841 tons; same, 24 hours, September 29, 1906, 1420 tons; October 9, 1532 tons; same, week ending September 29, 1906, 7646 tons; ending October 13, 8544 tons; same, month of September, 27,240 tons; month of October, 31,134 tons. Structural mill, one hour, October 11, 1906, 84 tons; same, 24 hours, July 7, 1906, 857 tons; October 11, 899 tons; October 12, 942 tons; October 13, 957 tons; week ending September 16, 1906, 4221 tons; week ending October 13, 5087 tons; month of July, 1906, 14,152 tons; month of October, 18,269 tons. Slabbing mill, 24 hours, March 31, 1906, 1190 tons; October 24, 1193 tons; week ending March 5, 6052 tons; week ending October 6, 6400 tons; January, 1903, 24,693 tons; October, 27,773 tons. Plate mill, one hour, December 20, 1905, 47 tons; October 27, 51 tons; 12 hours, November 16, 1903, 440 tons, and October 30, 1906, 445 tons; 24 hours, November 16, 1903, 736 tons; October 18, 751 tons; October 20, 763 tons; October 27, 814 tons; week ending March 5, 1906, 3604 tons; ending October 20, 3989 tons; ending October 27, 4013 tons; month of March, 1906, 14,396 tons; October, 16,078 tons.

Cement department plant No. 3, 24 hours, September 25, 1906, 5110 barrels; October 25, 5120 barrels; October 27, 5130 barrels; October 29, 5189 barrels; October 30, 5210 barrels; January, 1906, 138,000 barrels; October, 145,000 barrels. Plants 2 and 3, January, 1906, 187,000 barrels; October, 192,000 barrels.

Milwaukee Works, 8-in. mill, April, 1905, 2172 tons; October, 2326 tons. No. 1 9-in. mill, October, 1902, 2845 tons; October, 1906, 2850 tons. The 21-in. mill, October, 1905, 4677 tons; October, 1906, 4736 tons. Total mills, March, 1905, 21,982 tons; October, 1906, 23,018 tons. All bars, March, 1906, 16,354 tons; October, 1906, 17,113 tons.

At receiver's sale at Birmingham, Ala., November 5, all the properties of the Lookout Mountain Iron Company, except the stock in the commissaries and all the bills receivable, were bought by the First National Bank of Cincinnati for \$305,475. The property sold consists of a blast furnace at Battelle, Ala.; 1200 acres of mineral land, 150 coke ovens, and several coal and ore mines and equipment.

Upon the completion of the new light rail mill which the Illinois Steel Company is building at South Chicago the bar mill, which is now operating on light rails at Milwaukee, will turn to plow beams and the heavier merchant sections. This will give the company an increased bar tonnage of 60,000 tons a year, which will be available early in February.

The case of the Union Bridge Company, Pittsburgh, vs. the United States, involving the right of the Government to compel the alteration of bridges so as to expedite navigation, will be heard by the Supreme Court December 3.

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HARDWARE

WHEN in a manufacturing establishment it is recognized by the management that it is desirable to have a good cost system installed to replace an imperfect or unsatisfactory one it is not often an easy matter to have it decided upon and successfully put into operation. Apart from the inherent difficulty and complexity of the problem there is frequently a lack of sympathy with the effort on the part of those in charge of the operation of the factory. The indifference or opposition of those responsible for the methods which have been followed for years with but little change or improvement has to be reckoned with. There is no doubt that in many cases one of the main causes of dissatisfaction with modern cost methods is due to the attitude of the factory superintendent, especially if he is of the old school. He is too apt to take the position that the installation of a modern cost system means interference with his methods in the factory and that it will cause trouble for himself, his foreman and his men. He is somewhat afraid that the information secured through the system will lessen his importance and the results will be misinterpreted by his superiors, whom he thinks do not fully understand the difficulties of his position. His authority, which has in the past been absolute, he fears is to be divided. He thinks that his weaknesses will be brought to light and will be emphasized more than his strong points. He believes that he will be found fault with both for what he has done and for what he has not done. He feels, perhaps, that the general results of his work have been satisfactory and expresses his position by quoting the old adage, "Let well enough alone."

The normal line of advance in the improvement of the business system of the factory is on the initiative of those now in charge, without calling in outside talent or professional organizers of factory systems. Assuming that there is a fair though inadequate system in force, it can ordinarily be supplemented and improved without making any immediate and revolutionary change in methods. There may be a gradual addition of one feature after another so as to make the cost records give the desired information. If, however, the person in charge is opposed to such changes or to any modification of existing methods or is without ability to make the requisite improvements there is a situation which requires tact and management to cope with successfully. This attitude on the part of the superintendent, in large establishments at least, can often be best overcome by the professional systematizer or production engineer, not only on account of the independence of his position, but also on account of the unbiased perspective which he can take of the business, and his experience in different lines of manufacture, which enables him to recognize the underlying principles at once without regard to the form in which they appear. While he of course cannot understand the particular business he is systematizing as well as a man thoroughly trained in the business, he can, with the assistance of such a man and working in conjunction with him, frequently secure results which it would be impossible for either to achieve alone. At the same time it is in most cases desirable that the reform should start from within and the details of the cost system be gradually developed under existing management. If, however, there is anything like indifference to the impor-

tance of the matter or unwillingness or inability to make requisite changes it may be necessary to put the work into other hands.

Condition of Trade.

The election and the attention given to political matters in most of the States, especially during the week under review, undoubtedly interfered somewhat with current business, but had no material influence on the general features of the situation. Retail trade as usual at this season is in large volume and the local merchants find their stocks steadily drawn upon and in not a few cases becoming light or broken. Urgent calls for shipment of orders, perhaps placed some time ago, are made upon the manufacturers or jobbers, for whose delay in sending the goods sufficient allowance is not always made by the impatient merchants whose tardiness in purchasing is the cause of not a little of their trouble. The great volume of business is, however, the explanation of the existing scarcity of goods in an increasing number of lines, especially as the demands of the trade were so persistent that manufacturers were not given the usual opportunity of accumulating during the old time mid-summer dull season a supply for the fall trade. Many of them were thus obliged to enter on the present season with well filled order books and practically empty warehouses. There seems to be little improvement in the facility of obtaining raw materials and manufacturers are complaining of the difficulty they experience on this account. At the same time the cost of producing goods under the disadvantages of an abnormally heavy pressure and in many cases at gradually advancing wages increases quite perceptibly the cost of their products. On this account many advances have been chronicled and others are being made from time to time. These advances are in practically all cases of moderate extent and indicate the conservativeness of manufacturers. Some of them indeed, who have a good supply of material, are selling their products at prices which they could not afford if they were obliged to purchase raw material at existing prices. Notwithstanding the advances which have been made buyers generally regard the market with confidence and are not deterred from placing orders by an apprehension of early declines. Reports from manufacturers and merchants, wholesale and retail, in all parts of the country, indicate the prevalence of very prosperous conditions and the outlook for a continuance of a large volume of business is regarded as promising. There is some complaint in regard to collections, which are in some sections uncomfortably sluggish, but the financial situation is regarded as sound and giving little ground for apprehension.

Chicago.

The volume of business transacted by several of the leading Western jobbers during October eclipsed all previous records and it is the prevailing impression in the trade that these totals will stand for some time. The 27 business days in the month of course enhanced the gross volume, although the daily average showed a fair increase over September and some of the spring months. Inasmuch as the retail merchants continue to clamor for immediate shipments indications are that consumption is being maintained and that stocks are not accumulating. To advise his salesmen more specifically on what lines early deliveries cannot be expected one local jobber re-

requested each of his departments to furnish a list of goods on which manufacturers' shipments are deferred. When the lists were tabulated it was found that it encompassed so many lines that it would be almost an impossibility for the salesmen to familiarize themselves with them and the bulletin was not issued. The shortage of Black and Galvanized Sheets is reflected in all classes of goods manufactured from these materials and jobbers' stocks, on account of deferred shipments, are badly depleted. A like condition has never before been experienced in the Hardware trade and there is now little hope of improvement before the first of the year. Notwithstanding the reports of poor collections in the East Western credit men characterize them as generally fair, while on the Pacific Coast accounts are being met with universal promptness. This is undoubtedly due to the prosperity of the agricultural communities and the distribution of insurance funds in San Francisco and the immediate vicinity. Advances have been announced on Hammers, Washboards, Stamped Tinware, Tinnners' Trimmings, and Wash Boilers. In the heavier lines, as noted last week, Colled Chain has been marked up 15 cents per 100 pounds, and Trace Chain five per cent. All classes of Sheet Metal goods and Stamped Ware are higher as a result of the recent Sheet advance, and the high cost of Metals has brought about an increase in the selling price of Brass Faucets of 10 per cent.

NOTES ON PRICES.

Wire Nails.—Shortage in Steel is more pronounced, and this, with the scarcity of cars, is delaying shipments from mill to an annoying extent, putting mills two or three weeks behind in shipments. The market is very strong and it is understood that some of the smaller mills are asking a premium of about 5 cents per keg above official quotations for prompt shipments. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers.....\$1.85
Carload lots to retail merchants..... 1.90

New York.—Demand continues good and jobbers have little trouble in keeping stocks assorted by the fairly prompt receipt of shipments from mill. New York quotations on small lots at store are on the basis of \$2.05 per keg.

Chicago.—The Steel shortage from which Wire mills are suffering is growing more acute, the Donora, Pa., plant of the American Steel & Wire Company having been shut down two days last week on account of the failure of the Steel supply. The new tonnage booked thus far this month already compares favorably with that taken on in October, although the manufacturers do not anticipate that this rate will be maintained throughout the month. On the first of November the leading interest booked orders of all classes of goods and material amounting to nearly 15,000 tons, which is a heavy total for a day's business in November. Notwithstanding the heavy shipments made by the mills last month stocks in the hands of jobbers are very low, indicating that consumption continues to be well maintained. Official quotations, which are being firmly maintained, are as follows: \$2 in car lots to jobbers and \$2.05 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—New tonnage in Wire Nails placed in October was not as large as in the previous month, but was very satisfactory. Output in October was heavy, but would have been still larger were it not for the continued shortage in supply of Steel which is still restricting output to some extent. The shortage of cars is being severely felt, and the mills are from two to three weeks or longer behind in shipments. The tone of the market is very firm, and we are advised that some of the small independent mills continue to ask about \$1 premium over official prices for prompt shipments. We quote: Wire Nails, \$1.85 in carloads to the large jobbing trade and \$1.90 in carloads to retail merchants, f.o.b. Pittsburgh, plus actual freight to point of delivery, terms 60 days,

less 2 per cent. off for cash in 10 days. The above prices are now absolute minimum of the market.

Cut Nails.—As stated in our report last week, no change in prices was made by the Cut Nail Association at its meeting, held on November 1. It developed, however, that most of the mills were obtaining a premium over official quotations. It was arranged in case of an advance in the price of Wire Nails that an automatic advance of the same amount should take place in Cut Nails. The mills are about 30 days behind shipments, virtually without stocks and are shipping direct from the machines. Some mills are refusing to accept orders for shipment earlier than January 1. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$1.90; less than carloads, to jobbers, \$1.95; less than carloads, to retailers, \$2.05. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

New York.—The sizes of Nails most in demand, especially 8 and 10 penny, sometimes command a premium over regular prices, where jobbers have them in stock, so as to be able to make immediate deliveries. Demand continues unusually good for the season. Quotations are on the basis of \$2.05 to \$2.10 per keg, according to seller, above which a premium of 5 cents per keg is sometimes asked for popular sizes.

Chicago.—At the meeting of the Cut Nail Association, held on Wednesday of last week, no price changes were made, though the market is unusually firm, Nails that are particularly in demand being scarce and hard to get. Deliveries are still greatly hampered by the scarcity of Steel and the shortage of cars. Quotations prevail as follows: Steel Cut Nails, in car lots, \$1.95 to \$2; less than car lots, \$2.05; Iron Cut Nails, \$2.05 to \$2.10, in car lots; less than car lots, \$2.15.

Pittsburgh.—The action of the Cut Nail Association in reaffirming prices at its meeting, held on Wednesday, October 31, was rather a surprise to the trade, which confidently expected an advance. The continued shortage in Steel and in supply of cars is interfering very much with output and shipments. Stocks of 8, 10 and 20 penny Nails in the hands of jobbers and also at the mills are very light. The tone of the market is firm, and mills in the Wheeling district continue to quote \$2 and higher, f.o.b. Pittsburgh, for prompt shipment. Official prices, on which, however, premiums of 10 to 15 cents per keg are being paid for prompt deliveries, are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$1.90; less than carloads, to jobbers, \$1.95; less than carloads, to retailers, \$2.05. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 5 and 10 cents advance on Steel Cut Nails.

Barb Wire.—New business now amounts to a very small volume with mills, owing to the lateness of the season. Specifications on contract orders are coming in liberally and back orders are well cleaned up. The market is firm. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	\$2.00	\$2.30
Retailers, carload lots	2.05	2.35
Retailers, less than carload lots.....	2.15	2.45

Chicago.—As is customary at this season the demand for Barb Wire suffers a decline, as large outside work in the way of Fence erection is already being deferred to the spring months. Prices, however, are firmly maintained and unchanged as follows: To jobbers, Chicago, car lots, Painted, \$2.15; Galvanized, \$2.45; to retailers, car lots, Painted, \$2.20; Galvanized, \$2.50; retailers, less than car lots, Painted, \$2.30; Galvanized, \$2.60; Staples, Bright, in car lots, \$2.10; Galvanized, \$2.40; car lots to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—The amount of new business being placed is very light, owing to the lateness of the season, but specifications on contracts continue to come in freely and the mills are now well caught up on back orders. The tone of the market is very firm, and we are advised that official prices are being rigidly held. We quote: Painted Barb Wire, \$2, and Galvanized \$2.30, in carload

lots to the large jobbing trade, with the usual advance of \$1 a ton to retailers in carload lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. off for cash in 10 days.

Smooth Fence Wire.—The mills are behind with their shipments, the supplying of the heavy demand being interfered with by the scarcity of cars and the shortage of Steel. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads\$1.70
Retailers, carloads 1.75

The foregoing prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	12½	13	14	15	16
Annealed.....Base.	\$0.05	.10	.15	.25	.35	.45	.55		
Galvanized.....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15	

Chicago.—Wire manufacturers are doing their utmost to meet the demands of the manufacturing trade and to improve shipments which have been deferred from one to three months, according to gauge. Makers of Field Fencing are likewise clamoring for shipments and their fall production has been greatly curtailed thus far on account of their inability to secure material. Quotations are unchanged as follows: Jobbers, \$1.85 f.o.b., Chicago, in car lots; retailers, \$1.90.

Pittsburgh.—We note a continued heavy demand for Wire for manufacturing purposes, and the leading mills have been prorating orders for sometime. The makers of Wire Fencing are using an unusual heavy tonnage, while stocks of Wire at the mills are very light. Output continues to be restricted by the shortage in Steel and scarcity of cars is interfering with shipments. Specifications on contracts are coming in very freely and the mills are from four to six weeks behind in deliveries. The tone of the market is firm, and we are advised that official prices are being firmly held. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads\$1.70
Retailers, carloads 1.75

The above prices are for base numbers, 6 to 9.

Elbows and Shoes.—The transition from association control to an open market on Conductor Elbows and Shoes was reported some weeks ago in these columns. Prices have since declined heavily, and are still exceedingly irregular so that it is difficult to make a quotation that will fairly represent the market. A discount of 85 and 10 per cent., however, announced by one manufacturer, does not seem to be much below the level to which the market has fallen.

Tacks.—As stated last week in these columns, the market for Tacks has recently shown especial firmness. Under date of November 1 advances were announced by leading manufacturers, among whom there seems to have been some concerted action. The new base discounts are the same as those given in our last week's report and are of course supplemented by the usual additional discounts to jobbers and other large buyers.

Upholsterers' Nails.—An advance of about 10 per cent. is announced by several makers of Gilt Upholsterers' Nails. The change covers both brass and brass plated goods.

Plumbers' Torches.—Leading manufacturers of Plumbers' Torches and Furnaces have recently made advances in their quotations approximating 10 per cent. The increased cost of raw material, especially Brass, is referred to as the occasion of the change.

Pumps.—Quotations on Pumps have recently shown an upward tendency, especially on lines in which Brass is used. There is apparently no slackening of competition, but manufacturers are advancing their prices by independent action, due to increased manufacturing costs. In a general way the market to good retail buyers may be represented by a discount from 75 and 10 to 75, 10 and 5 per cent. on Pitcher Spout, and 60 per cent. on Cistern Pumps.

Cast Butts.—Manufacturers seem to be toning up their quotations on Cast Butts, although this is apparent rather from a withdrawal of concessions previously given

than from positive advances. The market, however, may be said to be in the neighborhood of 5 per cent. higher.

Iron Sinks.—Important manufacturers of Iron Sinks advanced their prices on November 1, the action being caused, it is said, by shortened supplies of raw material and the necessity of purchasing at higher prices. The change amounts to approximately 12½ per cent. on all sizes of Sinks, and makes the present ruling discount on plain Cast Iron Sinks 60 per cent., and on galvanized 65 per cent.

Copper Bull Rings.—Although the line of Copper Bull Rings is not an important one, as regards volume of transactions, prices on these goods are always of some interest to the trade at large. Quotations of some manufacturers have recently shown advances of from 10 to 15 per cent.

Cap and Set Screws.—In view of the heavy demand for Set and Cap Screws, and the acute scarcity of stock referred to in *The Iron Age* of a week ago leading manufacturers have made a general advance. The market to retail trade may now be represented by the following discounts:

Discount.

Set Screws, Iron, Round and Cup Points, Square	
Heads and Headless.....	75, 10 and 7½ %
Hexagon and Square Head Cap Screws.....	70, 10 and 7½ %
Round Head Cap Screws.....	50 and 7½ %
Fillister Head Cap Screws.....	60 and 7½ %
Flat Head Cap Screws.....	50 and 7½ %
Button Head Cap Screws.....	50 and 7½ %

Silver Plated Ware.—The high price paid for Silver Bullion in recent purchases by the Government has emphasized the advancing tendency of the market for that metal. As a result higher prices are ruling for Sterling Silver Ware and also for silver plated Flat Ware. The advance in the latter line which is of special interest to the Hardware trade amounts to about 5 per cent., and is said to have been made by concerted action on the part of leading manufacturers. Silver Plated Cutlery also shows an advancing tendency.

Rope.—Current demand is good and manufacturers are busy preparing for large shipments to northern points before navigation closes on the Great Lakes, about the middle of this month. The advance in the price of Manila Rope, which was noticed last week, is apparently being maintained. New York quotations on Rope are as follows: Pure Manila, 12½ to 13 cents; B quality, 11½ to 12 cents; Pure Sisal, 9 cents; No. 2 quality, 7½ to 7¾ cents; No. 1 Jute, ¼ in. and up, 8 to 8¼ cents; No. 2 Jute, 7½ to 7¾ cents per pound.

Window Glass.—About 2000 pot capacity has signed the agreement for a central selling agency; the committee which has the matter in charge is now desirous of obtaining at least 2200 pot capacity as signers. The capacity of the country is in the neighborhood of 2400 pots, and if 400 pots remained outside the combination the market could easily be demoralized. It is understood that Kansas Window Glass manufacturers are favorably inclined toward the plan of a central selling agency, but the State laws are not favorable to combinations which are formed to advance prices. It remains to be seen whether some way can be found for these manufacturers to join the movement without becoming liable. Demand has improved somewhat with colder weather, but it is stated that prices at which manufacturers are more or less generally selling, 90 and 10 and 5 for single and 90 and 20 per cent. discount for double strength Glass, from the manufacturer's list, represents a loss to them. Jobbers' quotations, from jobbers' list, October 1, 1903, are as follows: Greater New York, single, 90 and 10; double, 90 and 15 per cent. discount.

Spirits Turpentine.—Business has been light and of a jobbing character during the week under review. The demand has been for small lots covering immediate requirements. New York quotations are as follows, according to quantity: Oil Barrels, 69¼ to 69¾ cents; Machine Made Barrels, 69¾ to 70¼ cents per gallon.

Oils.—An advance of 1 cent per gallon in the price of Linseed Oil has taken place in this market. The advance is attributed to the strong position and advancing prices

of Flax Seed. Crushers are buying liberally to supply their winter and early spring requirements, so as to get the seed in their warehouses before navigation on the Great Lakes closes. This demand results in a strong seed market, which is reflected in the Oil situation. New York quotations are as follows, according to quality and seller: City Raw, 40 to 41 cents per gallon. Out of town Raw, 39 to 40 cents per gallon. Boiled Oil is 1 to 2 cents per gallon over Raw. There have been changes in the price of some Vegetable, Animal and Fish Oils, representing advances of from 1 to 5 cents per gallon, the larger portion of advances, however, being limited to 1 to 2 cents. Among the Vegetable Oils so affected are Linseed, Cotton Seed, Coconut, Olive and Palm Logas. Among the Animal and Fish Oils advanced are Lard, Neatsfoot, Prime Tallow, Red Elaine, Saponified and Menhaden.

IRON AND STEEL INDUSTRIES BOARD OF TRADE.

THE Iron and Steel Industries Board of Trade, publisher of Ealy's Blue Book of confidential credits, New York office 299 Broadway, has just issued a new book of credits containing nearly 1100 pages, 8 x 10 in. The present company, incorporated in 1905 with an authorized capital of \$350,000, has been organized among prominent merchants and manufacturers in the Iron, Steel and allied trades in the United States, to publish a reference book of credit, especially confined to the interests of manufacturers, merchants and others having trade, business and financial interests in common in the various manufactures of metals. There are 24 degrees of capital ratings and nine phases of credit or pay rating, while applying to the change sheets, issued at frequent intervals, there are 62 designations to tersely cover the field of fluctuations favorable or otherwise. The aim of the system is to tell the financial worth and business characteristics of a customer, based, it is said, on facts as they are revealed by counting house ledgers regarding paying records and the business record of the individual under consideration with other creditors of whom he has bought. This includes financial worth, paying of bills and business antecedents.

Branch offices have been established in Chicago, Cleveland, Cincinnati, St. Louis, Pittsburgh, Philadelphia and Boston, to be followed later with similar branches in other large cities. At these branches there will be advisory boards composed of business men, whose function it will be to facilitate the adjustment of trade matters, such as failures, suspensions and business embarrassments of any kind, comparatively near the debtor's address and by the people interested, thus enabling creditors to intelligently assist a deserving debtor or to get the most out of a bad account. There is a collection department also, with a legal staff, as well as an auditing department for special investigations of books of account.

THE NEBRASKA RETAIL HARDWARE ASSOCIATION will hold, in connection with its annual meeting, which will be held at Omaha February 4, 5, 6 and 7, 1907, a Hardware exposition. This is the first exhibition of the kind attempted by the Nebraska Association, but its officers are so confident of success that they anticipate no trouble in getting a sufficient number of exhibitors. J. Frank Barr, the secretary, Lincoln, is now in correspondence with manufacturers all over the country, many of whom have assured their intention to be represented. A diagram of the floor space of the Auditorium, where the exhibition will be given, shows sections from "A" to "T," which will be divided into booths and rented at from \$1.50 to \$2.50 per front foot, according to desirability of location. No floor space will be sold for less than 10 ft. frontage. On each side of the floor space will be open boxes 5 ft. above the floor and approximately 6 x 6 ft., with convenient entrances from the floor, which will be rented at \$5 to \$10, according to location. In the rear of the gallery on each side is a floor space 20 x 100 ft. which will be largely devoted to Carriages, Buggies and Farm Implements.

A BUYER'S PRICE RECORD.

A RELIABLE record of prices, showing not only what has been paid for goods purchased but also containing all quotations received verbally or by letter is indispensable to a wideawake Hardware merchant. Not that it is impossible to buy goods intelligently and secure fairly favorable prices without a complete record of this kind; many successful Hardwaremen have demonstrated that this can be done. It must be doubted, however, if they are as sure of getting the bottom and of maintaining their points in cases of difference with the concerns from whom they buy as they would be if provided with complete records of past transactions to which they could readily refer. The Hardware business, moreover, always marked by great multiplicity of detail, is increasing so rapidly in scope and in the variety of goods handled that confusion would be almost certain if the buyer depended on his memory in following his ever changing markets.

Three Essential Requirements

to be demanded in a price record are simplicity, convenience and reliability. The last of course is all important, but unless the first two characteristics are present the system will fall down of its own weight, as a merchant's time is too valuable to be occupied with com-

Fasts				
S & Co.	Sash	2 1/2 100	50 1/10	7/8 - 06
	Casement	102 P 1000	50 1/10	Brown 7/8
	Chain	32 500	40 + 20	Letter 7/8

Example of Price Record Kept by Rising & Thorne.

plicated machinery or petty details. The record must, however, be comprehensive enough, to cover all lines handled and include every new quotation, with information as to when and how it was made.

An Efficient System.

The accompanying illustration is reproduced from a portion of the price record kept by F. L. Thorne, of the well-known firm of Rising & Thorne, Newark, N. J. Although entirely simple, Mr. Thorne's system affords all the information necessary for keeping track of prices in a large and diversified business. The record is kept in a bound book about the size of the ordinary day book used in a retail store. The book is indexed and contains headings for every line carried in stock, corresponding in this respect to the cost books commonly used in the trade. Pages are ruled to make five columns, as shown in the cut, and the headings for general classifications of stock usually stand at the head of a page. This is not necessary, however, and in the case of inactive lines or those having but few subdivisions, two or three can be grouped on a page. Mr. Thorne's method of keeping the book may be best explained by reference to the illustration, showing a section devoted to the line of Fasts. The figures used are of course fictitious.

In the first column is entered the name of concerns from whom the goods are bought; in the second, subclassifications coming under the main heading of Fasts, as Sash Fasts, Casement Fasts, Chain Fasts, &c. The third column gives the manufacturers' numbers, brands or other distinguishing marks under which it has also been found convenient to enter the list price. The fourth column contains the price quoted, in this case represented by discounts of 50 and two 10's, 50 and four 10's, &c., while the last column states when and how the price was made. When the date only is entered it indicates an invoice on which the price was made. "Brown, 3-12" shows that the price of 50 and four 10's was made verbally on March 12 by Brown, S. & Co.'s salesman. The last quotation

was obviously received in a letter of April 8. Merchants will readily appreciate that the keeping of such a record involves but little trouble, which will be amply repaid by the accessibility and reliability of the information thus compiled, which must be of great assistance in placing orders and checking invoices.

TRAVELING SALESMEN AND CATALOGUE HOUSE COMPETITION.

DISCUSSING the subject of the competition of retail catalogue houses the J. Stevens Arms & Tool Company, Chicopee Falls, Mass., expresses the following views, in which it will be observed that the point is made that the advent of this form of competition has been largely due to the methods and practices of the retail merchant himself. The part which the traveling salesman has to play in helping merchants to overcome the conditions which beset them is also enforced. After referring to this contest for supremacy as in a way "the salesman's battle," inasmuch as if the catalogue houses continue to thrive and increase in number the field of the traveler will be very much curtailed as a result of the contraction of the business done by local merchants, the company continues:

The present condition has been brought about almost entirely by the retailers themselves, but few of them realize it and none will admit it.

Absurd Profits.

The day is past for the retailer to expect to obtain from an intelligent consuming public 500 and 600 per cent. profit on small items as some of them are now doing. For instance, the common Gimlet should cost the retailer not over \$2.25 per gross (*The Iron Age* quotes \$2), and very many retailers are still getting 10 cents each, about 675 per cent. profit. Retail catalogue houses quote 3 cents each, or 100 per cent., and this applies to nearly all the small goods the retail Hardwareman sells.

A retailer said to the writer last week he could sell no more Gimlets at 5 cents each than he could at 10 cents each; besides, if he could not make a good profit on the small items he would have to shut up shop. We replied, it is not the quantity you would sell, but the impression you create of being "high priced;" in fact, called a robber.

When the writer first moved here he had occasion to buy a few goods of a local Hardware "dealer," and among other things was a common 6-in. Damper at 25 cents and a common 6-in. Four-Piece Elbow at 35 cents. He politely inquired if these prices were correct, and after being assured they were paid the bill without controversy and has never bought a cent's worth of goods at that store since, and a receipted bill is kept as a souvenir.

Merchants Buying Away From Home.

Furthermore, in the past a majority of the country merchants, when wanting anything for their own personal use, instead of buying it of the local merchants have sent away to get different items at cost. The druggist in ordering his spring fishing tackle, baseballs, &c., orders his Lawn Mower or Hardware for the new house he is building. The Hardware merchant wants a carriage for his own use; instead of buying at home, he orders it direct at cost. If his wife wants a new dress, cloak or hat he goes to the city for it, to the detriment of home trade, because the desired assortment is not to be found at home; but the home merchant would gladly order at a reasonable profit any of the special goods if but advised of what was wanted.

If the country merchants will send away for their personal wants, can they blame the farmer for doing likewise? The large catalogues give him an assortment unequaled to select from.

We are all Alike

when it comes to buying for our own personal needs and every one tries to buy where they can get the best value, and it is up to the modern merchant to give this value, and he can do so if he will. With the assistance of the Hardware jobber the retail Hardware merchant can meet catalogue house prices for cash, freight added with few exceptions if he chooses, unless he wants the old time Dutchman's 1 per cent. on everything. The live, up to date merchant can make as great a net profit to-day on the capital invested as he could 10 years ago, but the world moves, business methods change and he must change to meet changed conditions or die commercially of dry rot.

Traveling Salesmen are the Retail Merchants' Educators

and it is for the salesmen to educate their customers to meet modern conditions; hence the success of the retail trade in competing with the catalogue house in reality rests largely with them. Calling catalogue houses "cat houses" and other vile names does not in any way injure them, but rather reflects on the one who applies it. Show up their methods, the quality of their goods—when inferior, such as watered Paint—but don't indulge in mud slinging. It shows lack of sound argument and belittles the salesman and merchant and their cause in the estimation of every one.

Every retailer should have the catalogues "on tap," and be thoroughly posted regarding their prices and know what goods he can meet at a profit and what he cannot.

TRADE ITEMS.

THE annual meeting of the Wright Wire Company, Worcester, Mass., resulted in several important changes in the board of officers, the board as elected being as follows: President and general manager, George M. Wright; vice-president and treasurer, Herbert N. Wright; assistant treasurer, John A. Denholm; directors, George M. Wright, Herbert N. Wright, J. F. Searle, Charles M. Thayer, Lucian B. Butler, O. W. Norcross and Rufus B. Fowler. One of the new directors is Mr. Searle, who has for 18 years been the Eastern traveling salesman for the company. Messrs. Butler and Thayer are also new members of the board.

THE GARLAND NUT & RIVET COMPANY, Pittsburgh, is making a large addition to its plant at West Pittsburgh, consisting of a brick building 60 x 200 ft. in size two stories high, and has recently completed a building of similar size. These large extensions to the plant are necessitated by the rapidly increasing business of the company, and also by the fact that the concern is going into the manufacture of heavier sizes of Bolts and will make a larger variety of styles.

THE IOWA RETAIL HARDWARE ASSOCIATION, A. R. Sale, secretary, Mason City, Iowa, is now ready to furnish diagrams, contracts, &c., relative to the second annual Hardware exhibition, which will be held in conjunction with the next annual meeting of the association, February 19-22, next, at Des Moines. The exhibition will be held in the new Shrine Temple, which is said to be the finest hall for the purpose in the State.

THE TACK MACHINERY formerly owned by Stetson & Woodward, Kingston, Mass., has been sold to Ripley & Bartlett, Plymouth, Mass., manufacturers of Tacks and Small Nails. This machinery includes some 40 machines of medium and small size and modern pattern.

WILLIAM B. COOLEY, who met his death in the deplorable disaster at Atlantic City on the 28th ult., was well known and liked by the Hardware trade of the Eastern States, over which he traveled. Mr. Cooley was born in 1868 at Milford, N. J. For the past six years he had been connected with Robert H. Ingersoll & Bro., 51 and 53 Maiden Lane, New York, for three years as manager of their Forty-second street store and for the balance of the time as traveling salesman in the East. Mr. Cooley leaves a widow.

FRANK MOSSBERG COMPANY, Attleboro, Mass., is distributing to merchants carrying its goods a handsome easel sign referring to its line of Wrenches. The quality of the goods is stated in crisp phrases and four designs of the Wrench are reproduced in actual sizes and colors.

Chas. W. Dings has withdrawn from the Hackett Hardware Company, Ogdensburg, N. Y., to take a more lucrative position elsewhere. Mr. Dings has been secretary and buyer of the Hackett Company since its incorporation in 1900, and has been associated with the business for 16 years. Mr. Dings' new connection is with the Oswego Hardware Company, Oswego, N. Y., of which he will be secretary and treasurer as well as general manager. The latter company carries on an extensive wholesale and retail business.

TRADE WINNING METHODS.

This department is for the description of approved methods of carrying on and extending business, and a cordial invitation is given to merchants to co-operate in the effort to make it suggestive and of practical use to the trade.

BLACKSMITH WINDOW DISPLAY.

GEO. KRAUSE HARDWARE COMPANY, Lebanon, Pa., refers to the blacksmith window display which is reproduced herewith as having been a first rate advertisement for its retail department generally. While there was no appreciable increase in the sale of Blacksmiths' Tools, &c., the company received numerous inquiries as to prices of Blowers and related goods. The exhibit attracted much attention, and people from all parts of the city, and the suburbs especially, came to see it. Notice was also thus directed to the other window, which contained a tastefully arranged assortment of Sporting Goods for the fall.

The company's two show windows are each 12 ft. wide, 6 ft. deep and 14 ft. high. One, the scene of the blacksmith display, has a paneled back and ceiling. It took three men about six hours to prepare the exhibit. The back and left side were covered with Red Rosin Pudding Paper, which was lined with Chalk to secure a brick wall effect. A Forge was then built in the southwest corner, as well as a chimney, which was painted black. A Blower was connected with the Forge by means of Galvanized Stove Pipe, some coal obtained from a nearby blacksmith shop, and dry red and blue Paint being put in the center of the coal to carry out the idea of a fire. Different Tools were hung around on the wall, as shown, and the Blacksmith's Apron and Sledges were arranged as if the smith had just finished his work. The bottom of the window was covered with black earth pounded down to represent a well hardened floor. Above the Forge on back of window was hung a sign referring to the brand of Horseshoes carried. The exhibit aroused so much talk and attracted so much attention that it was allowed to remain in the window for nearly two weeks.

AN INDIANA MERCHANT'S STOVE ADVERTISEMENT.

IN a recent issue of a Richmond, Ind., paper the Jones Hardware Company of that city occupied nearly half a page in which attention was directed to Stoves. Four good-sized cuts were used to show different types, and as an endorsement of the quality of this particular make the statement was conspicuously made that 2000 of the Stoves are now in use in Richmond. Assurance is also prominently given that the competition of catalogue houses has no terrors for the company, as per the following lines in display type running across the page:

We Meet the Prices of Any Catalogue House!

We Set the Stove Up in Your Own House Complete!

We Start the Fire Before You Pay Us for Them!

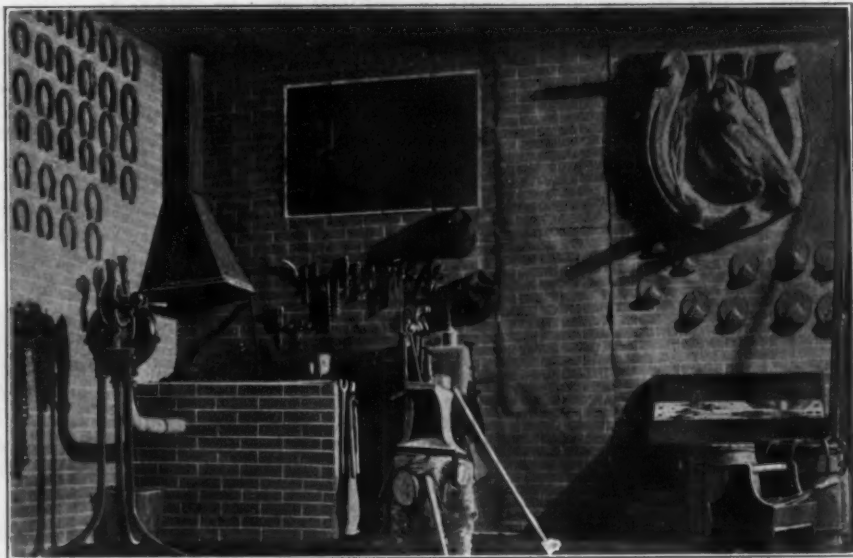
No Freight! No Drayage! No Breakage! No Labor! No Risk! No Delay.

THOS. JARRETT, JR., Dorchester, Neb., during the past month issued a small illustrated catalogue calling attention to a few lines for fall and winter use, such as Stoves and Heaters, Husking Gloves and Mittens, Food Choppers, Lamps, Harness, Paint, Washing Machines, Axes, Guns, Ammunition, &c., on which prices were given. The cata-

logue is 6 by 9 $\frac{1}{4}$ in., the pages and cover being in pink of two shades. Throughout the catalogue the statement is frequently made that "It Pays to Trade at Jarrett's." Mr. Jarrett handles Hardware, Tinware, Harness, Stoves, Field and Garden Seeds and Notions, and also makes a specialty of 5 and 10 cent counter goods.

CHRISTMAS HINTS POST CARD.

THE DALAND COMPANY, INCORPORATED, Salem, Mass., is not going to miss any Christmas trade this year if it can be helped. The company has already got its campaign vigorously under way, the first gun being in the form of a post card which was circulated widely a week or two since. The substance of the card is reproduced below:



Blacksmith Window Display by Geo. Krause Hardware Company.

CHRISTMAS HINTS

Toboggans	\$2.50 to \$5.00	Fancy Thermometers	.50, .75, 1.00
Snow Shoes	3.00 to 8.00	Thermometers	.10 to 5.00
Skis, with pole	3.00 to 5.00	Watches, Guaranteed	1.00, 1.50, 2.00
Indian Moccasins	1.50 to 5.00	Nut Picks, Nickeled	.20 Set
Sleds	.50 to 6.00	Nut Picks, Silver Plated	.50, 1.00, 1.50
Double Runners	5.00	Table Knives and Forks, Set of Six	1.00 to 5.00
Skates	.50 to 5.00	The Gillette Safety Razor	5.00
Shot Guns	6.50 to 35.00	The Star Safety Razor	1.50 to 15.00
Rifles	3.50 to 20.00	Our Own Razor, Warranted	1.75 and 2.00
Solid Leather Gun Cases	4.00	Our Own Scissors, Warranted	.40 to .75
Air Rifles	.75	Scissors	.25 to 1.00
Po'o Sticks	.05 to 1.00	Dandy Shiners	1.00
The Irish Mail	5.00		
Tool Chests	1.00 to 5.00		
Boxing Gloves, per Set	1.00 to 5.00		
Carving Sets	1.00 to 10.00		
Pocket Knives	.25 to 4.50		

Rogers Plated Flat Table Ware, Manicure Files, Etc., Boys' Cart⁸ and Wheelbarrows, Shaving Mugs, Scissors, Strops and Soap, Dog and Cat Collars, Revolvers, Plant Stands, Gunning and Foot Ball Clothing, Duck Decoys, Hunters' Knives, and Compasses.

DALAND CO., Inc., THE HARDWARE MEN
215 Essex Street, Salem, Mass.

The card is about 9 x 7 in. in size and is printed in two colors. It will be observed that it calls attention to an interesting and varied line of articles which make very appropriate Christmas gifts for boys and girls as well as the more mature. Other circulars will follow at intervals right up to the holidays, so that the Salem public will probably become very conversant with the fact that the Daland Company is in a position to fill many of its wants and requirements in the way of useful and practical gifts.

SPECIALTIES OR SIDE LINES.

BY S. M. S.

ARE specialties or side lines a source of profit to the Hardware dealer? A great deal depends upon the goods and the manner in which they are exploited. The merchant with specialties in which there are distinctive and exclusive features can use them to profitable advantage, as the merits and special features of the articles may be dwelt upon at sufficient length to convince or interest the prospective buyer.

Do Not Let Your Competitor

get ahead of you in the matter of specialties that are at all useful or likely to sell well. Let your store be the first in town to have the goods on display. Be just a day or two ahead of your competitor in displaying early spring or early fall specialties. It will not hurt you to carry a small quantity of the goods before you really need them. It will be a big advertisement for people to know that you are the first in the field with everything that may be considered a household necessity.

A Great Many Sales Are Lost

and a great deal of dead stock is carried by Hardwaremen who are in the habit of placing specialty goods in the rear of the store, or practically out of sight. Such goods are probably rarely overhauled and in time get to be known as "stickers." If it is necessary on account of lack of room to place specialty goods in the rear of the store or out of sight elsewhere have them looked over and examined and brought out to the light at least once a week.

If the Goods Are Kept Out

where they can be seen at all times they are very much more apt to sell than if hidden away. It is well if possible not to allow specialties to remain in the house through two inventories. If goods have been in the house some time before taking inventory be sure you make a price on them or use such extraordinary efforts as will sell them out before the next inventory comes. This rule of keeping goods in the store as short a time as possible will make specialties profitable, as well as keeping the investment in them within reasonable and safe limits.

Mark specialty goods so that you may know when they entered the store. This will help to prevent their staying too long. For instance, goods received in January, 1906, might be marked A, and February, 1906, B, and so on each month.

Display Specialties

as much as possible. The more of these goods you display the more you will sell. The more attractive you make your displays the more you will interest people in your goods. Always keep your displays in good trim. See that they are kept clean and as free from dust as possible.

It will be advantageous to the merchant occasionally to have a Paint window, a Sewing Machine window, a Bicycle window. Hardware as the principal stock may have a larger share of the window displays, but it will help the sale of specialties if they receive their share, one after the other.

Know Your Goods.

As far as possible you should be thoroughly acquainted with the service, quality and utility of the specialties you handle. If there are any goods about which you have any doubts, try them out yourself. Also make inquiries of customers who have purchased them. Find out all you can about the goods you are selling, so that you may know how to recommend them to others or how best to get rid of them in case they are not giving satisfaction or moving as rapidly as you wish.

Charles H. Roberts of the Hardware firm of Roberts, Gardner & Co., Wellsboro, Pa., has disposed of his interest to his partners, who will continue the business as Gardner & Co.

DEPARTMENT AND FAIR STORE HARDWARE.

BY CLARFIELD.

THE question of department and fair store Hardware has often been discussed in the columns of *The Iron Age*. While it is doubtless true that the products of some of the best manufacturers in the country are represented in some department stores, yet the fact remains undisputed that many a house which undersells the legitimate trade deals in inferior merchandise. The Hardware lines in the average department and fair stores are far inferior to the same lines as found in the average Hardware store. In this, as in other things, there are widely differing grades of excellence. There are several department stores in the United States in which a buyer is as safe as he would be in any specialty store. This cannot truthfully be said of the fair stores.

Hardware Merchants Would Do Well

to study and learn to apply some methods in vogue in these mammoth establishments. It is in his method of merchandizing that this large and unpopular competitor excels his smaller neighbor. The store arrangements, the accounting system, the time and labor saving devices, the special sales and the advertising are all worthy of imitation to some degree. So much for the department stores which handle standard lines of Hardware. Their large buying and close selling are largely made possible by the methods employed. In the quick turning of capital lies one great secret of their success.

High Quality Goods Rarely Carried.

The smaller department stores and fair stores, however, very seldom carry goods of high quality. Many of these stores have not more available capital than an ordinary single line merchant. Their pretended bargains are inferior goods sold at a fair profit. Visit several of these stores at random, and you will find in them Agate Ironware that bears the appearance of having been honored with a visit from the small boy and his ball club. There is Tinware through which you can poke your finger without much effort. The Hammers are cast iron, and bright steel goods have a suspicious look that tells of poor material and poorer workmanship. All of these and more are paraded before an unsuspecting public at ridiculously low prices as compared with those of the Hardwareman who offers a better grade.

Both Kinds of Goods Side By Side.

The Hardwareman has more to fear from this competition than from that of the large store which sells standard goods, and about the only way to meet it is to carry a line of these cheap goods side by side with the better ones. Then let the customer choose whichever he pleases, knowing exactly what he is getting for his money.

REQUESTS FOR CATALOGUES, &c.

The trade is given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS for catalogues, price-lists, quotations, &c., have been received from the following houses, with whom manufacturers may desire to communicate:

FROM F. J. COOLEGE & SON, Atlanta, Ga., who have succeeded F. J. Coledge & Bro., who for nearly 30 years have manufactured Paint and Varnish and dealt in Brushes, Paint and Glass. Lately a large new building has been erected on Peter street as a branch house. The firm has also added a Hardware department, wholesale and retail, which will be under the charge of J. J. Pace, for several years with the Anderson Hardware Company of Atlanta.

FROM WILLIAM JASPERSEN, formerly connected with the Helsler Mfg. Company, St. Mary's, Ohio, as secretary, who has severed his connection to engage in business for himself. He has succeeded to the business of C. Buchler, general Mill, Factory and Electrical Supplies, which was established in 1881.

THE PURE PAINT LAW OF NORTH DAKOTA.

The following communication from well-known Paint manufacturers is of interest, as touching on some of the important questions involved in connection with the Pure Paint Legislation of North Dakota:

To the Editor: It seems to us that most of the so-called "pure Paint" legislation of North Dakota has so far missed the pertinent things in Paint manufacture, and caters mostly to superstitions and "popular" ideas of what a Paint should be, ignoring to a great extent the things that the modern progressive Paint manufacturer knows to be the true essentials of a good Paint.

The most persistent popular superstitions about Paint, that are seemingly fostered rather than combatted by this legislation, are: First, that White Lead and Zinc Oxide are, *per se*, the best pigments. As a matter of fact, the Hydrated Carbonate of Lead (White Lead) is in many respects a very unsatisfactory pigment:

1. Because it is unstable chemically.
2. Because it is a cumulative poison.
3. It has a very marked oxidizing effect on the Oil, ultimately destroying the Oil film and causing "chalking," which is, perhaps, the greatest defect of Lead Paints.
4. It discolors in time, owing to exposure to air containing sulphur gases.

Zinc Oxide as a pigment leads to cracking of the Paint film, and ultimate disintegration of the surface. The function of Turpentine is purely that of a volatile medium, without any inherent superiority over a number of other mediums of the same class, and which have certain advantages over Turpentine, such, for instance, as not having an injurious effect on the health of the painter.

The central point of the whole Paint question, as seen by the most progressive and scientific manufacturers, is that the life of the Paint lies in the Oil and the method of preparing it for use, and not in the pigments. It makes very little difference what pigments are used, so long as there is a proper relation between them to control their various chemical activities and preserve the necessary opacity or covering power and durability, and no one pigment or class of pigments can be set up as an absolute standard against all others.

We most particularly decry legislative discrimination in favor of certain pigments and mediums on grounds which have little basis in fact, especially when those pigments and mediums favored are manufactured and controlled for the most part by large corporations.

It seems to us that it is a fallacy to set up analytical purity as a basis of judging so complex a product as Paint. More technical knowledge of the conditions and essentials of Paint manufacture would undoubtedly lead to a very considerable modification of the conclusions arrived at as a result of these analytical investigations.

All reputable Paint manufacturers are in favor of anything that will tend to insure honesty in their particular line of manufacture, but we do not think this end will be obtained by snap judgments on so complicated and technical a subject as Paint manufacture by men, however conscientious, who have little or no practical knowledge of the conditions to be met, and who ignore entirely the immense amount of research which has been carried on by the manufacturers to meet these conditions in a way that will give the best results both from the standpoint of the consumer and the producer.

F. O. PIERCE COMPANY.

NEW YORK, November 5, 1906.

THE EAGLE COOPERAGE WORKS, Circleville, Ohio, manufacturer of Eagle Mop Wringers, Detachable Mops and Rex Dish Mops, is sending to its friends in the trade a souvenir in the form of a neat little leather combined card case, bill and memorandum book with the recipient's name stamped on the inside cover in gold. In sending it out the company expresses thanks for past favors and solicits a continuance of same.

THE AMERICAN HARDWARE CORPORATION.

A RECENT issue of the New Britain *Daily Herald* contains an article which seems to substantiate the claim of that city to have within its limits a corporation with more employees than any other in the state of Connecticut. The concern in question is the American Hardware Corporation, whose constituent companies and the number of persons employed are as follows: P. & F. Corbin, 2000; Corbin Screw Corporation, 1500; Corbin Cabinet Lock Company, 900; Russell & Erwin Mfg. Company, 1700; and Corbin Motor Vehicle Corporation, 250. This makes an imposing total of 6350 persons employed by the American Hardware Corporation, which number will be materially increased when the large addition to the plant of the Corbin Screw Corporation now under way is completed.

PRICE-LISTS, CIRCULARS, &c.

Manufacturers in Hardware and related lines are requested to send us copies of catalogues, price-lists, &c., for our catalogue department in New York; and at the same time to call attention to any new goods or additions to their lines, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.

CALDWELL MFG. COMPANY, Rochester, N. Y.: Illustrated pamphlet describing the Boucher Adjustable Shaving Glass.

THE BORN STEEL RANGE COMPANY, Cleveland, Ohio: Dealer's catalogue No. 16, 1906-07, devoted to Born Steel Ranges for family use, illustrating a number of series; also a partial line of the company's hotel and institution cooking outfits.

PRENTISS VISE COMPANY, 44 Barclay street, New York: Forty-ninth illustrated price-list showing the following styles of Vises: self-adjusting jaw, iron and wood-workers', filers' or finishers', watchmakers' and jewelers' Vises; also a line of Rapid Vises, Pipe Vises, Vise Drill Attachments, Quick Acting Lever Vises, Table Clamps for Vises, jewelers' Table Anvils, &c.

AMERICAN TAP & DIE COMPANY, successor to Nichols Bros., Greenfield, Mass.: Catalogue devoted to Butchers', Chefs', Grocers' and Fish Knives; Market, Family, Packing and Lamb Cleavers; Table, Kitchen, Market and Abattoir Steels; Butchers' and Kitchen Saws; Screw Plates, Taps, Dies, Stocks, Wrenches and Pipe Tools.

THE FOSTER-MUNGER COMPANY, Chicago, Ill.: Illustrated catalogue relating to Sash, Blinds, Doors, Store Fronts, Porch Posts, Columns, Stair Newels, Stairways, Mantels, Grille Work, Desks, Wood Carpet, Glass, Art Glass Windows, Composition Capitals and Pilasters, Moldings, Kitchen Cabinets, Builders' Hardware, Steel Ceilings, Carpenters' Tools, &c.

ONEIDA COMMUNITY, Oneida, N. Y.: Catalogue No. 31A, illustrating with list prices Game Traps, Clamps for setting Traps, Halter, Dog, Kennel, Cow, Pocket, and Trace Chains; Coll and Sash Chain, Snaps, &c.

MONTGOMERY & Co., 105-107 Fulton street, New York: Pamphlet devoted to Set Cap and Machine Screws; Hack Saw Blades, Files, Taps, Reamers, Music Wire, Drills, Drop Forged Wrenches, Wood and Lag Screws, Gauge Glasses, Sand Paper and Cloth, &c.

THE BRIDGEPORT HARDWARE MFG. COMPANY, Bridgeport, Conn.: Illustrated and descriptive catalogue devoted to Perfect Sliding Doors.

J. D. WARREN MFG. COMPANY, Chicago, Ill.: Folder No. 120, illustrated in four colors and describing Interchangeable Hardware Shelving in unit sections, showing 10 combinations; also separate cabinets and cases, costing \$4.50 per lineal foot and up.

BRODERICK & BASCOM ROPE COMPANY, St. Louis, Mo.: Blotter in the interest of "Powersteel" Wire Rope and Aerial Wire Rope Tramways.

EUROPEAN DEVICES FOR CONSUMPTION OF DENATURED ALCOHOL.

THE Department of Agriculture has prepared a report upon the devices that have been placed on the market in the leading countries of Europe for the consumption of denatured alcohol for light, heat and power purposes. It is expected that in a short time all these articles, which include Alcohol Stoves, Heaters, Lamps, Coffee Roasters, Flatirons, Motors for running farm machinery and Implements, &c., will be manufactured in this country and offered to users through the Hardware trade. For the information of manufacturers, jobbers and retailers, therefore, the Department has supplied to *The Iron Age* an advance abstract of this report, together with illustrations of the devices referred to, which are reproduced herewith.

ALCOHOL STOVES.

Denatured alcohol will be extremely useful for heating purposes, especially in localities remote from centers of

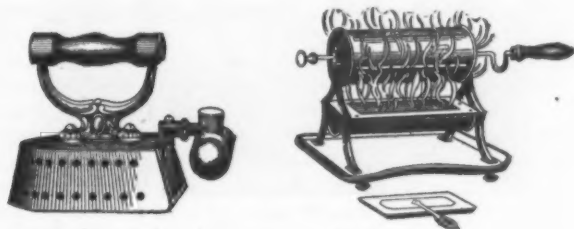


Fig. 1.—Alcohol Burner for Heating a Flatiron.

Fig. 2.—Alcohol Burner for Roasting Coffee.

the production of wood, coal, kerosene, gasoline, natural gas and oil, which now are the chief heating and illuminating agents. The success of the Alcohol Stove depends largely upon the character of the wick, which must absorb the alcohol and be so adjusted as to give the necessary heating surface. By converting the alcohol into a gas and burning the vapor thus formed the wick may be dispensed with and a more effective burner obtained. The general principles involved in heating with alcohol

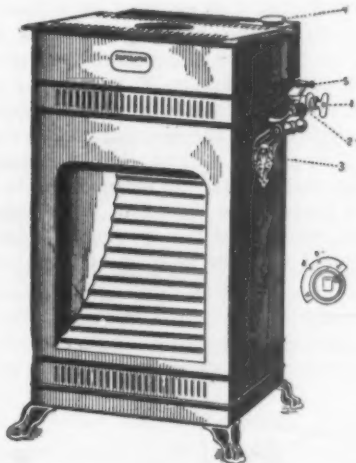


Fig. 3.—A Small Alcohol Stove for Heating Purposes.

are the same as for other heating substances; the only differences are in the methods of producing the combustion.

Alcohol burns with a pale blue flame which is intensely hot. It is without smoke, and if there be any odor at all it is an agreeable and not a disagreeable one. The products of combustion of pure alcohol are water and carbon dioxide. The latter gas should be conducted out of the room by the ordinary methods of ventilation. No form of burner should be allowed to pour the products of combustion into the room. The water which is formed is harmless, but the carbon dioxide, which is produced in large proportions, will soon vitiate the air of the room and tend to produce drowsiness, headache, and injury to

health. The common methods of burning gas and kerosene in a room without ventilation are also objectionable for the same reason. Some form of ventilation by means of which the products of combustion in such cases could be removed from the room through a chimney or otherwise is highly desirable.

Stoves of many different kinds have been invented for burning alcohol. There are Stoves for heating flatirons, soldering irons, crimping irons, roasting coffee, &c. A Smoothing Iron which is designed to be heated by alcohol is shown in Fig. 1, and a convenient Roaster for Coffee or Peanuts in Fig. 2.

A Stove suitable for heating purposes, except that it has no chimney for carrying off the products of combus-

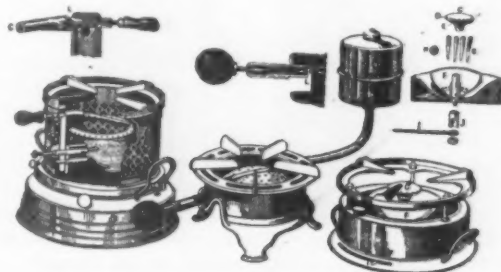


Fig. 4.—Three Varieties of Alcohol Heaters.

tion, is pictured in Fig. 3. In this figure No. 1 is the principal cock to control the admission of the gasified alcohol. No. 2 is the stop cock connecting with the heating apparatus for vaporizing the alcohol which is concealed in the mechanism of the stove. No. 3 is the stop cock for admitting a sufficient quantity of fresh alcohol before starting the Stove to vaporize the alcohol for burning purposes. It is used only at the time of starting the fire, after which it is closed. No. 4 is the opening through which the alcohol holder, which is just seen back of the Stove, is filled. No. 5 is a stop cock for drawing off any remaining spirit in the holder when it is desirable to have it empty. The small figure marked *a b* shows a device attached to the apparatus which makes it impossible to connect the alcohol gas forming apparatus and the Stove until everything is in readiness. This is a kind of time lock upon the key, which prevents the opening or closing of the stop cocks at inopportune moments, and thus makes it impossible to flood the Stove

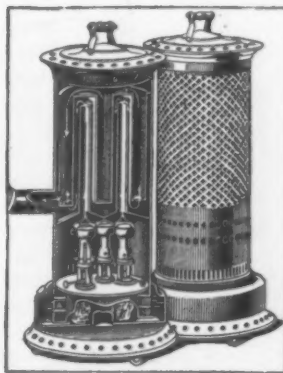


Fig. 5.—Alcohol Stove with Three Circular Burners.

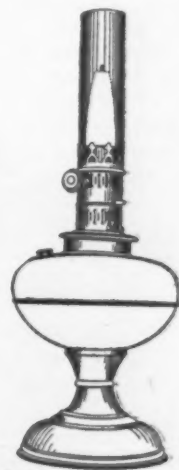


Fig. 6.—Alcohol Lamp with Pump Attachment.

with alcohol and cause an explosion. The fluted arrangement in the front is for the purpose of reflecting the heat of the burning alcohol so as to throw it out in the largest possible quantities into the room. This is only one of the types of Stove which may be used for heating purposes.

Another form of Stove is shown in Fig. 4. In this

Stove the vaporizer is supplied by wicks, which draw up the alcohol from the reservoir in the bottom. A small wick serves to set the apparatus in operation by first heating the vaporizing kiln. This wick is afterward extinguished and concealed in a sheet which is closed by a horizontal flap O. An ejector valve L, repre-

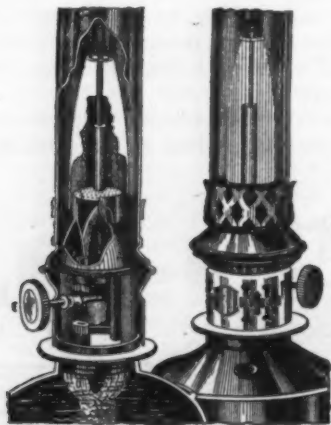


Fig. 7.—Alcohol Lamp with Asbestos Primer.

sented in the upper part of the diagram, regulates the discharge of the circle of burners C. Below the latter a white enameled disk of iron plate serves as a heat reflector. The two other forms of Stoves represented do not need any particular description.

Another form of Stove is shown in Fig. 5. This is a Stove supplied by three circular burners, which are shown in the cross section drawing. A double circulation of the products of combustion causes them to become separated and pass off through a stovepipe at a relatively low temperature, after having heated the air of the room as well as the vaporizer placed in the upper part of the apparatus.

ALCOHOL LAMPS.

Alcohol, as will be seen from the previous discussion respecting the Alcohol Stove, cannot be used directly for illuminating purposes. The flame does not possess any notable illuminating power. In order that alcohol may be used for illumination it must be burned in a state of gas and the heat produced by the combustion utilized to produce incandescence in the ordinary mantle which surrounds the common gas flame for the same purpose. It has been discovered that when certain earths, such as



Fig. 8.—Adaptation of an Alcohol Motor for Plowing.

thoria, in a state of fine subdivision, are subjected to the action of a high temperature, they become intensely white and produce by their incandescence the maximum degree of illumination. The thoria is first deposited upon some substance, such as cloth, and so distributed that when the cloth burns away the particles of thoria remain in the original shape of the mantle. When held over the

flame of gas or alcohol the particles become incandescent. To adjust an Alcohol Lamp for this purpose it is only necessary to make an attachment whereby the alcohol is first converted into a vapor. In order to light such a Lamp a portion of the alcohol must first be vaporized.

In Fig. 6 is shown an Alcohol Lamp which is the property of the Bureau of Chemistry. The illustration shows very plainly the external mechanism of the Lamp. The knob on the right is the handle of the pump, which brings a little of the alcohol around the wick holder delivering the alcohol to the vaporizing chamber. This handle is pressed down two or three times by the thumb, rising by means of a spring to its original position. A few drops of alcohol are pumped up and are ignited by holding a match to the opening at the handle or above. The alcohol burns with a colorless flame for from 30 to 60 sec. By this time the chamber is hot enough to volatilize the

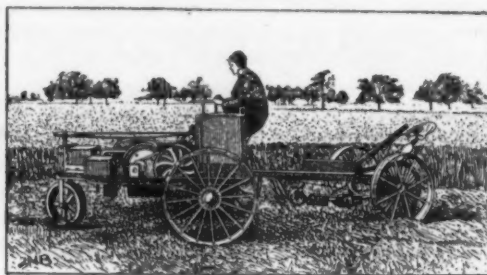


Fig. 9.—A Mowing Machine Propelled by an Alcohol Motor.

alcohol brought up by the wick. The milled head on the left is then opened and the match applied at the top of the chimney, when the alcohol vapor ignites in the same manner as gas and soon heats the thorium mantle, shown inside of the chimney, to a white heat. The Lamp then burns regularly without any further attention as long as any alcohol remains in the bowl.

In Fig. 7 are shown two views of another Lamp, the principle of which is only slightly different from that just described. The Lamp on the left is cut away in order to show the internal mechanism. The alcohol is fed to the wicks D and the copper vaporizer A placed under the mantle. The burner C is supplied by a Bunsen burner B placed beneath it, and having its output regulated by means of a needle valve attached to the regulator button E. A small lateral aperture, F, permits of the introduction of a ball of asbestos saturated with alcohol for starting the vaporization at the moment of lighting.

In this Lamp it is noticed that the small pump for lifting the alcohol to start the vaporization is omitted, and its place is taken by a light ball of asbestos saturated with alcohol, inserted at the opening F indicated.

It is evident that the amount of heat produced is to



Fig. 10.—Adaptation of an Alcohol Motor to a Reaper and Binder.

some extent a measure of the illuminating value when the incandescent mantle is taken into consideration. It is the high temperature which produces the incandescence, and therefore the gas which in burning gives the highest temperatures, other conditions being the same, would

be of the most value for illumination. All of these points must be considered to prevent the formation of wrong opinions concerning the efficiency of alcohol for illumination, heating and motive power, as compared with gasoline, which is the agent most used for these purposes, and which alcohol is expected to supersede.

ALCOHOL MOTORS.

It is quite certain that the use of Alcohol Motors on the farm will become quite common as soon as the technique of construction is practically complete and the price of alcohol is sufficiently low. Alcohol can be used for all purposes for which gasoline is employed, namely, the driving of Wagons, Carriages, Stationary Motors, Water Pumps, Mowing Machines, Plows, &c. Very little change need be made in the engine of a motor car designed to use gasoline to fit it for the use of alcohol. Gasoline becomes volatile at a temperature of blood heat (98.5 deg. F.), while a much greater degree of heat (158 to 176 deg. F.) is necessary to volatilize alcohol rapidly enough for motor purposes. This fact makes necessary a change in the explosion chamber of the engine when alcohol is to be used. This adjustment is especially important in the starting of the machine, as after it is in action the temperature of combustion is quite sufficient to easily produce the gasification necessary.

Fig. 8 represents an ordinary Plow suitable for attaching to a heavy motor apparatus driven by alcohol; Fig. 9 a Mowing Machine and Fig. 10 a Reaping and Binding Machine, both driven by alcohol motors. In regard to these heavy machines it may be said that they probably would come into use only on large farms where the surface of the soil is practically level. They would not be suitable for small farms nor those in hilly sections. In this connection attention is called to the fact that steam plowing, although practicable and profitable under certain conditions, has not been practiced to any great extent in this country; in fact, not nearly so much as in England. It is not likely, therefore, that plowing and harvesting by alcohol motors will come into use very soon, although the possibilities are worthy of the consideration of the thoughtful farmer. On the other hand, it seems probable that small motors for driving machines for chopping and grinding cattle food, pumping water and similar purposes may be brought into very general use as soon as the denatured alcohol becomes cheap enough to render its use practicable.

In the driving of motor engines the quantity of heat evolved is not always a measure of efficiency. It is not the purpose of the Department's reports to go into this subject at all, only to say that the vapor of alcohol can be more highly compressed at any given temperature without exploding than can the vapor of gasoline. As the decreased volume of the mixture of the explosive vapor and air is to a certain extent a measure of efficiency when engines are driven by the expansion of gases, the high degree of compressibility of the alcohol vapor without danger of explosion may compensate for the smaller quantity of heat which is generated by its combustion.

A WORD OF CAUTION.

The problems connected with the use of alcohol for driving machinery are somewhat technical, and it is only desired to call attention to the possible advantages to the farmer from this source of power, and also to point out the difficulties which must be overcome. In this connection it seems that a word of caution is needed, as in the exploitation of tax free alcohol extravagant opinions regarding its possibilities have been expressed. These exaggerated statements have been made without any intent to deceive or mislead, but on account of insufficient information. The natural tendency in all such matters is to select those points which are certain to be of great benefit and publish them broadcast, and to neglect the difficulties and dangers which lie in the path of progress along these lines.

Our farmers, who are naturally conservative, need very little caution in such matters, but it is important that a full understanding of the difficulties of these problems should be disseminated among the agricultural population. It is quite certain that if alcohol can be pro-

duced in the near future at a cost of not exceeding 25 or 30 cents per gallon of 95 per cent. strength it will be a most valuable source of power on the farm. Although with the present relative prices of alcohol and gasoline there is no financial advantage in the use of the former, it is highly probable that the price of gasoline will advance and that of alcohol fall. Thus the farmhouse and the barn may be liberally supplied with water at such an elevation that it can be used with all the facility enjoyed by those who live in the city by means of a safe, cheap, and effective method of pumping made possible by the alcohol motor.

The machinery around the barn and stables, which is utilized for chopping food and grinding grain in the preparation of rations for domesticated animals, should be of a character which is efficient and at the same time without danger. An alcohol motor placed in a small room separated from the barn at such a distance as not to endanger it in case of an accident would make it possible to supply power of this kind. Although alcohol is far less dangerous in use than gasoline, as far as probability of explosion is concerned, there should be no misunderstanding respecting the fact that it is an explosive substance, both when in the form of vapor and when mixed with air, and all the precautions which are used in the case of gasoline should be employed also with alcohol. While the use of these precautions will practically eliminate any source of danger, it is nevertheless advisable, even in the case of alcohol, to separate the building in which it is used from the barn, which contains more or less highly combustible matter. The fact that a substance is less dangerous than another is no excuse for omitting any of the precautions to prevent injury as the result of accident.

W. L. C.

Correspondence.

THE CONVENTIONS AT ATLANTIC CITY.

To the Editor:—In your editorial in *The Iron Age*, October 25, relating to the recent convention at Atlantic City, you say:

"While there was much advantage in the opportunities afforded for an interchange of views in regard to the trade situation and the various trade questions, the principal utility as well as the chief pleasure of the occasion was in the forming of acquaintances and the strengthening of personal relations between those in attendance. In this one of its chief ends was attained. Under the guise of a business assembly delegates were permitted to enjoy a very agreeable outing."

The writer is a member of the National Hardware Association and has attended its annual sessions for 12 years and feels that the statement which you have made does an injustice to that organization. Admitting that it is a pleasure to meet both jobbers and manufacturers at this annual gathering the interest shown by the jobbers at their executive sessions was fully equal, if not far beyond, that of any previous convention. A number of subjects of much importance to the trade were under discussion, but the meetings being of an executive character the details could not be given to the press for publication, but I feel confident that if you will take occasion to interview the jobbing trade and those who were present at the convention they would express themselves as fully satisfied with the work which was accomplished.

In referring to these annual gatherings as "an agreeable outing under the guise of a business assembly," I fear that you are not treating the jobbing trade fairly. What the manufacturers do I know not, but as far as the National Hardware Association is concerned I wish to emphasize the fact that business of importance was transacted, and that each and every one profited by his attendance.

MERCHANT.

D. J. Spence, Girard, Kan., has sold his business there to E. C. Hiett, and has opened a Hardware, Stove and Plumbing store at Frontenac, Kan.

J. T. Cronk has succeeded to the Hardware, Stove, Paint and Sporting Goods business of Wm. McCurdy, Dickens, Iowa.

THE YALE & TOWNE MFG. COMPANY.

AT a meeting of the stockholders of the Yale & Towne Mfg. Company held at its offices in Stamford, Conn., October 30, Frank H. Taylor was unanimously elected a director of the company, and at a subsequent meeting of the Board of Directors held on the same day was elected a vice-president of the company.

Mr. Taylor was born in Cincinnati, Ohio, and after leaving school entered Haverford College (near Philadelphia), where he graduated after a four years' course, immediately after which he entered Harvard University, from which he also graduated in the class of 1877, receiving the degree of A. B. After leaving college Mr. Taylor entered the employ of the George Fox Starch Company, Cincinnati, Ohio, as an apprentice, advancing through various stages to the position of superintendent. In 1882 he removed to Philadelphia, where he became one of the organizers and then treasurer of the Belmont Iron Company, of which ultimately he became the president. The plant of this company having been destroyed by fire Mr. Taylor in 1890 accepted the position of manager of the Philadelphia branch house of the Yale & Towne Mfg. Company, which he retained for the following seven years. In 1897 he transferred his residence to Pittsburgh, Pa., to accept an appointment as sales manager of the Westinghouse Electric & Mfg. Company. He served three years in this position and was then promoted to the position of fourth vice-president, in which he served for about three years, and finally was elected to the position of second vice-president, which he filled for the following three years and until he resigned in April, 1906. He is a director of the Westinghouse Electric & Mfg. Company and of the Provident Life & Trust Company of Philadelphia, and one of the trustees of the Engineers' Club of New York. As a vice-president of the Company Mr. Taylor's duties will relate equally to the manufacturing and commercial sides of the business and ultimately will include many of the matters which heretofore have been attended to by the president.

The present official organization of the Yale & Towne Mfg. Company is as follows: President, Henry R. Towne; vice-presidents, Schuyler Merritt and Frank H. Taylor; secretary, J. H. Towne; treasurer, A. R. Erskine; general manager, Kirk Brown; general superintendent, Walter C. Allen.

The Norka Tubular Frame Grindstone.

The grindstone frame shown in the accompanying cut is made of heavy tubing, 1 in. in diameter, strongly braced, so that it will not tip over either backward or sideways and stand firmly while in service. The frames are painted in blue and black. The stones are of selected grit and



The Norka Tubular Frame Grindstone.

run on antifriction bearings, while the boxes containing the bearings are heavy and strong. For shipping the stones are crated to prevent breakage and to insure the lowest freight rate. It requires about 10 minutes to set

up the frame and stone from the crate. The goods are being put on the market by the Whitman & Barnes Mfg. Company, Chicago, Ill.

Walker's Quick and Easy Orange Knife and Peeler No. 273.

Erie Specialty Company, Erie, Pa., is placing on the market the orange knife and peeler shown herewith. It has drop forged steel nickel plated blade and genuine stag handle, the blade being securely fastened in the handle. It is also mounted in white bone. In use the orange peel is slit from point to stem in six or eight



Walker's Quick and Easy Orange Knife and Peeler No. 273.

sections, when the peeling is easily removed with the back of the blade. With the point of the blade the core, or navel, is easily cut out, and the orange can be split open by inserting the blade at either end without waste of juice. The stag handled knives are mounted one-half dozen on display card, and those with white bone handles are put up one-half dozen in a case and also in fancy cases.

New Home Washer, 1907 Model.

The Standard Mfg. Company, Shelby, Ohio, is offering the improved washing machine shown herewith. It works on the same principle, it is explained, as a hand washboard, cleansing the clothes by light rubbing, at the same time forcing the water through every fibre and instantaneously reversing the current, absorbing the dirt and removing it from the clothes. This is effected by oscillating the machine, causing the water to change its center of gravity by forming a whirlpool under the cor-



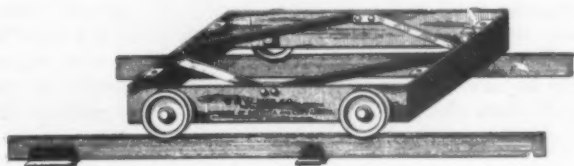
New Home Washer, 1907 Model.

rugated rubbing board, sucking it down on the clothes, squeezing and rubbing them at the same time that they are acted upon by the reversing whirlpool, and changed with the current so that a new surface is brought into contact with the rubbing board at each stroke of the machine. The framework is constructed of three detachable steel tubing legs, secured to the metal frame by bolts and the center post of the machine extended where the legs meet, forming a clamp which secures them at that point by means of a clamp nut, all of which con-

tributes to strength, durability, lightness and perfect floor adjustment. Louisiana cypress is used in the wood construction, the joints are matched and the tub bound with three electric welded galvanized steel hoops, crimped to expand and contract and prevent their breaking. The hinged warp proof steam tight cover is to prevent escape of fumes. The only bearing is a case hardened ball race filled with steel balls, with nothing requiring oiling. The total weight of the machine is 53 lb.

Ideal Industrial Railway.

The G. & W. Mfg. Company, 26 Cortlandt street, New York, maker of structural iron and steel work, has just put on the market the Ideal industrial railway, here illustrated. The object of it is to supply an outfit moderately priced and capable of quick and easy installation by even the inexpert, either for temporary or permanent operation. The simplicity of the parts permits of track laying in stores, warehouses and buildings of any kind, out of doors, across a sidewalk or public thoroughfare where a permit is unobtainable, &c., as a load of material can be run into a building and the track taken up and put out of the way as readily as moving a pair of skids. The car body is made of wrought iron and braced, having cast iron grooved roller bearing wheels, on which a box superstructure can be built by the individual for carrying packages, while long material can be loaded on it as furnished. The rails are composed of 16-ft. sections $\frac{1}{2} \times 3$ in. wrought iron placed on edge, slotted at each end, so that the rails cannot move out of the brackets or cast slotted shoes, with bottom lugs which prick into floor, ground, ice, &c., and obviate any necessity for hav-



Ideal Industrial Railway; Body and Track.

ing cross ties. An average size body, regularly made, is 24 x 30 in. in dimensions, but they can be made of any size or gauge of material expeditiously, without extra charge for special construction. The grooved wheels can be supplied in any diameter from 5 to 12 in., or even larger. To allow the passage of wagons and teams the rails can be quickly lifted out of the way, without disturbing the cast sockets. Switches and curves can be constructed of the same style of wrought iron bars by merely bending them sufficiently to accomplish the purpose, at no increase in cost, as the difference is merely that between a straight or curved bar, easily bent. Where loads are heavy a few extra shoes can be distributed along the line to stiffen the rails. Turntables of its own manufacture can also be supplied for this outfit by the company.

Kelly's Pruning Shears.

The Kelly Outlery Works, Toledo, Ohio, for which G. E. Sutton, 253 Broadway, New York, is the selling representative, offers the Kelly pruning shear, grape picker and flower gatherer here illustrated. It is 7 in. extreme length. Both blades and handle are forged, each from one piece of cutlery steel, tempered, sharpened and warranted. Every part back of the pivot is japan finished and the blades are ground bright. The lower jaw of holder is secured to the lower cutting jaw, the upper jaw of holder opening and closing simultaneously with the upper cutting jaw, yet the two are distinct from each other, the movement of the subsidiary holder being regulated and controlled by a wire spring. In use the upper jaws close concurrently until the holder grips firmly whatever is to be detached, when the cutting jaw passes on and accomplishes the severing process, the

holder meanwhile securely retaining the object cut off until released by the individual. In the pruning of rose bushes, shrubbery, vines, &c., it is often a convenience to retain the refuse momentarily until it can be released ad-

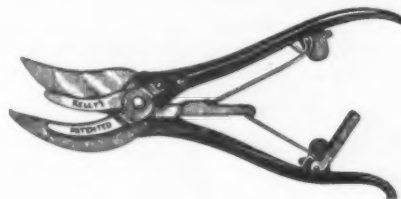


Fig. 1.—Kelly's Pruning Shear, Grape Picker, Flower Gatherer, &c.

vantageously, as for instance, with thorny bushes, &c., thus preventing needless litter and double handling. Likewise in cutting off rose and other blooms, grapes, oranges and various fruits one hand only need be used, leaving the other free for any purpose. The blade points are slender and sharp enough, extending 11-16 in. beyond the holder, so that defective fruit can be cut and dropped



Fig. 2.—Shear Holding a Bunch of Grapes.

before cutting the bunch, &c., if so desired. As shown there is a metal loop to keep the handles together when not in use.

Livingston Horse Nail.

The Livingston Nail Company, 104 Reade street, New York, has put on the market the Livingston horse nail, as here shown. In designing this nail the purpose has been to make it somewhat composite in character and give it a universality that would satisfy exacting horseshoers



Fig. 1.—Livingston Horse Nail, Actual Size No. 7.

throughout the country. It is made under the newest cold rolled process, and a marked feature is the uniformity, special attention being given to the point and set of the nail and shape of head, so that the hammer strikes squarely, driving the nail so that shaped as it is the point comes out of the hoof at the proper place; instead of entering the quick. The name Livingston is plainly stamped on the side of every head, each nail is thrice inspected, covering every point in the manufacture of it, and the nails are fully guaranteed by the company. The horse nails are put up in 5-lb. pasteboard cartons and packed five cartons in a dovetailed wood box. The Liv-



Fig. 2.—Livingston Nail Company's Trademark.

ingston trademark is reproduced in Fig. 2, it being a facsimile of the surname of S. Otis Livingston, as he always wrote it, the business of the company having been established by him originally in 1845.

Reliance Mop Wringer.

The Lee Chair Company, Oneida, N. Y., is manufacturing the Reliance mop wringer illustrated herewith. It is made of malleable iron, making it practically unbreakable and attention is especially called to its simplicity, as it has no gears, eccentrics, springs or rollers, but is operated wholly by a lever and powerful knuckle joint connected with a loose follower to which the pressure



Reliance Mop Wringer.

board is attached. The latter automatically conforms to the shape of the mop so that no pains are necessary to distribute the mop evenly in the wringer. The leverage exerted is said to be great enough to raise 1000 lb. easily from the floor. The Reliance mop wringer is made in two sizes, No. 1, intended for domestic use, and No. 2 for hotels.

Little Gem Christmas Tree Holder.

The C. A. Peck Hardware Company, Berlin, Wis., manufacturer of metal specialties, has just placed on the market the Little Gem Christmas tree holder shown herewith in use and folded for shipment. This seasonable specialty is made entirely of wrought steel, is 16 in. in diameter, and 6 in. high. It is adjustable to a tree of



Little Gem Christmas Tree Holder.

any size above 1½ in. in diameter, and it is declared will hold it firmly in place without danger of tipping. A screw which will be observed in the base at the center sets into the bottom of the tree, while thumb screws are provided for fitting the adjustable collar above which it is supported by braces. The device has no loose parts and

folds compactly for shipping, weighing 20 lb. to the dozen. It can be retailed at 50 cents.

Ideal Garden Rake.

The Cronk & Carrier Mfg. Company, Elmira, N. Y., is putting on the market for the coming season the garden rake shown herewith. The head is made from high carbon steel, while the flange reinforcing the head

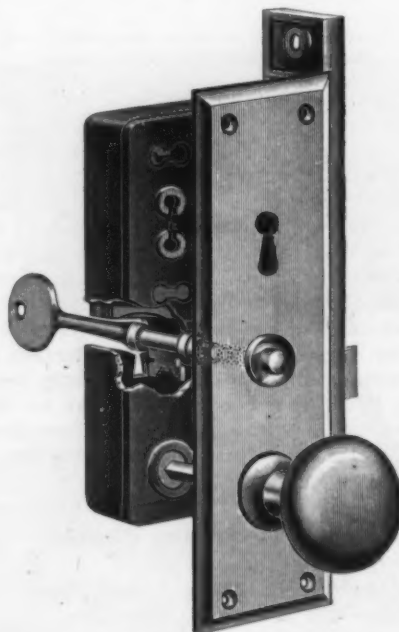


Ideal Garden Rake.

makes it very rigid. The teeth are slightly curved and the back of the rake is straight and smooth, making it handy for use about the stable or for smoothing off garden beds, &c. The rake is furnished with 12, 14 and 16 teeth and weighs from 30 to 32 lb. per dozen.

Hotel Lock with Indicator.

Russell & Erwin Mfg. Company, New Britain, Conn., is offering the hotel lock No. 607, shown in the accompanying cut. It is furnished with a push button indicator, which makes it possible to tell from the outside whether a room is occupied or not. The illustration shows the outside knob and escutcheon with key inserted in the lock from the inside of the door. In this position the

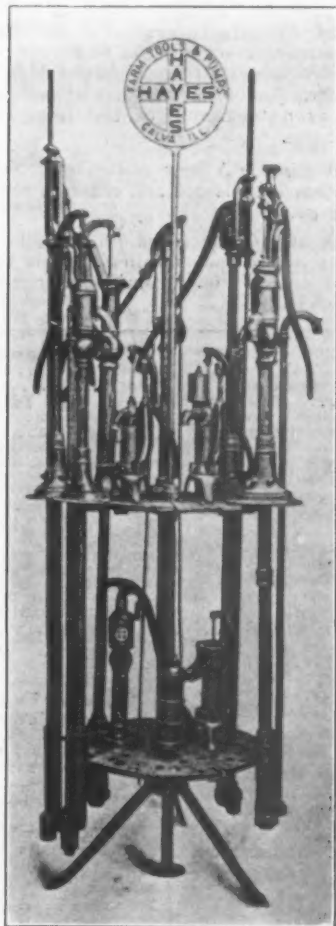


Hotel Lock No. 607, with Indicator.

end of the key stem prevents pushing back the button. On the contrary, when the key is withdrawn there is nothing to prevent the button from being pushed back, this fact indicating to the attendant that the room is unoccupied. Following out the same idea the company is furnishing revolving disc indicators with locks operated by key inside as well as those operated by turn knob from the outside. This disc, revolving with the key or turn knob, indicates whether or not a room is occupied by presenting plain or capped surfaces in the face of the outside escutcheon.

Revolving Pump Display Rack.

Believing in the well-known trade saw that "goods well displayed are half sold," the Hayes Pump & Planter



Revolving Pump Display Rack.

Company, Galva, Ill., has devised the ingenious display rack here illustrated to promote the sale of its line of pumps. It is made of metal and its main axis, which rests firmly on the floor, is supported by three braces

like the legs of a tripod. There are two shelves revolving together having a capacity for displaying nine pump stands. There is also sufficient space on the upper shelf for six cistern pumps, while on the lower shelf cylinders, valves and other accessories can be shown. The firm has recently issued a new catalogue, including some additions to its product, which now comprises a complete line of pumps for hand and windmill use.

Lawn King Rake.

F. E. Kohler & Co., Canton, Ohio, have recently added to their line the Lawn King rake, shown herewith. It is similar in construction to their Lawn Queen rake, but the head, instead of being tinned, is lacquered with a

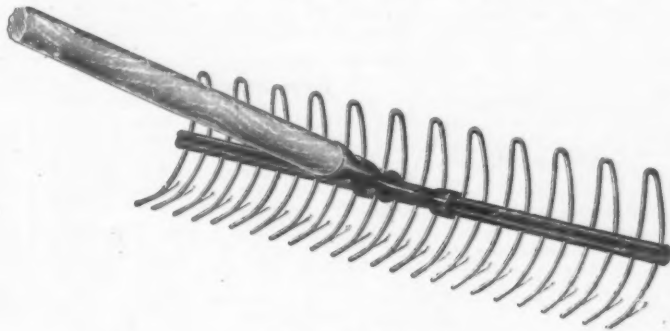


Fig. 1.—Lawn King Rake.

gold lacquer, while the teeth are fixed in place by a patented device illustrated in Fig. 2, being kinked between the walls of the head or channel through which they pass. There are 24 teeth made of best

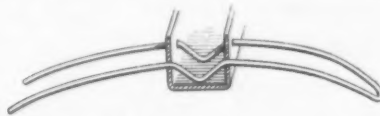


Fig. 2.—Method of Fixing Teeth in Lawn King Rake.

quality copper bronzed furniture wire. The rake is reversible and can be used for either leaves or grass, but affords no place for dirt or rubbish to gather. It costs less than tinned rakes, but is declared by the manufacturers to be just as good and durable.

PAINTS, OILS AND COLORS

Animal, Fish and Vegetable Oils—

Animal, Fish and Vegetable Oils—	per gal.
Linseed, City, raw.....	40 @ 41
City, Boiled.....	41 @ 42
State and Western, raw.....	39 @ 40
Raw Calcutta, in bbls.....	@ 40
Lard, Extra Prime, Winter.....	76 @ 77
Extra No. 1.....	50 @ 52
No. 1.....	45 @ 49
Cotton-seed, Crude f.o.b. mills.....	29 @ 32
Summer Yellow, Prime.....	42 @ 43
Summer Yellow, off grades.....	@ 42
Sperm, Crude.....	52 @ 53
Natural Spring.....	@ 53
Bleached Spring.....	@ 53
Natural Winter.....	65 @ 66
Bleached Winter.....	68 @ 69
Bleached Winter, Extra.....	70 @ 72
Tallow, Prime.....	56 @ 57
Whale, Crude.....	32 @ 33
Natural Winter.....	45 @ 46
Bleached Winter.....	48 @ 49
Extra Bleached Winter.....	47 @ 48
Menhaden, Brown, Strained.....	30 @ 31
Light Strained.....	30 @ 31
Bleached, Winter.....	@ 31
Extra Bleached, Winter.....	@ 31
Southern.....	25 @ 26
Cocanut, Ceylon.....	84 @ 85
Cochin.....	84 @ 85
Cod, Domestic, Prime.....	30 @ 33
Newfoundland.....	35 @ 37
Red, Elaine.....	48 @ 51
Saponified.....	7 @ 8
Olive, Italian, bbls.....	64 @ 67
Neatfoot, Prime.....	49 @ 50
Palm, Logos.....	7 @ 7 1/2

Mineral Oils—

Black, 29 gravity, 25@30 cold test.....	104 @ 114
29 gravity, 15 cold test.....	114 @ 124
Summer.....	104 @ 114
Cylinder, light filtered.....	18 @ 19
Dark, filtered.....	16 @ 17
Paraffine, 903-907 gravity.....	134 @ 144
903 gravity.....	124 @ 134
883 gravity.....	104 @ 109
Red.....	124 @ 144

Miscellaneous—

Barytes:	
White, Foreign.....	per ton \$18.50 @ 20.00
Amer. floated.....	per ton 19.00 @ 20.00
Off color.....	per ton 11.50 @ 15.50
Chalk, in bulk.....	per ton 3.00 @ 3.25
In bbls.....	per 100 lb. @ 35
China Clay, English.....	per ton 11.00 @ 17.00
Cobalt, Oxide.....	per 100 lb. 2.50 @ 2.60
Whiting, Commercial.....	per 100 lb. .43 @ .48
Gilders.....	per 100 lb. .50 @ .55
Ex. Gilders.....	per 100 lb. .55 @ .60
Putty, Commercial.....	per 100 lb.
In bladders.....	\$1.70 @ 1.85
In bbls. or tubs.....	1.20 @ 1.40
In 1 lb to 5 lb cans.....	2.65 @ 2.95
In 12 1/2 to 50 lb cans.....	1.50 @ 1.90
Spirits Turpentine.....	per gal.
In Oil bbls.....	69 1/2 @ 69 3/4
In machine bbls.....	69 @ 70 1/4
Glue.....	per lb.
Cabinet.....	.11 @ .15
Common Bone.....	.7 @ .9
Extra White.....	.18 @ .24
Foot Stock, White.....	.11 @ .14
Foot Stock, Brown.....	.8 @ 1.1
German Hide.....	.12 @ .18
French.....	.10 @ .40
Irish.....	.13 @ .16
Low Grade.....	.9 @ 1.2
Medium White.....	.14 @ .17
Gum Shellac.....	per lb.
Bones, Dried.....	.67 @ .69
Button.....	.40 @ .60
Diamond L.....	.53 @ .65
Fine Orange.....	.60 @ .65
A. C. Garnet.....	.49 @ .51
Kala Button.....	.37 @ .38
G. A. L. Garnet.....	.45 @ .45 1/2
D. C.....	.55 @ .58
Octagon B.....	.45 @ .53 1/2
T. N.....	.48 @ .48
V. S. O.....	.54 @ .55
Colors In Oil.....	per lb.
Black, Lamblack.....	.12 @ .14
Blue, Chi-ese.....	.36 @ .46
Blue, Prussian.....	.32 @ .38

Blue, Ultramarine.....	per lb. 13 @ 14
Brown, Vandyke.....	per lb. 11 @ 14
Green, Chrome.....	per lb. 12 @ 16
Green, Paris.....	per lb. 24 @ 24
Sienna, Raw.....	per lb. 12 @ 15
Sienna, Burnt.....	per lb. 12 @ 15
Umber, Raw.....	per lb. 11 @ 14
Umber, Burnt.....	per lb. 11 @ 14

White Lead, Zinc, &c.—

Lead, English white, in Oil.....	per lb. 9 1/2 @ 10
Lead, American white, in Oil.....	per lb. 7 1/4 @ 7 1/2
Lots of 500 lb or over.....	@ 7 1/4
Lots less than 500 lb.....	@ 7 1/2
In Barrels.....	@ 6 1/2
Lead, White, in oil, 25 lb tin.....	per tin add to keg price @ 1 1/4
Lead, White, in oil, 12 1/2 lb tin.....	per tin add to keg price @ 1
Lead, White, in oil, 1 to 5 lb.....	per tin add to keg price @ 1 1/4
Lead, American, Terms: For lots 12 tons and over 1/4 % rebate; and 2% for cash if paid in 15 days from date of invoice; for lots of 500 lbs. and over 2% for cash if paid in 15 days from date of invoice, for lots of less than 500 lbs. net.....	per lb. 6 1/2 @ 6 3/4
Lead, White, Dry, in bbls.....	per bbl. 5 1/2 @ 5 3/4
Zinc, American, dry.....	per lb. 5 1/2 @ 5 3/4
Zinc, French.....	per lb. 5 1/2 @ 5 3/4
Antwerp, Red Seal, dry.....	per lb. 5 1/2 @ 5 3/4
Antwerp, Green Seal, dry.....	per lb. 5 1/2 @ 5 3/4
Paris, Red Seal, dry.....	per lb. 5 1/2 @ 5 3/4
Paris, Green Seal, dry.....	per lb. 5 1/2 @ 5 3/4
Zinc, V. M. French, in Poppy Oil.....	per lb. 5 1/2 @ 5 3/4
Green Seal.....	per lb. 5 1/2 @ 5 3/4
Lots of 1 ton and over.....	13 1/2 @ 13 3/4
Lots of less than 1 ton.....	13 1/2 @ 13 3/4
Zinc, V. M. French, in Poppy Oil.....	per lb. 5 1/2 @ 5 3/4
Red Seal.....	per lb. 5 1/2 @ 5 3/4
Lots of 1 ton and over.....	11 1/2 @ 12 1/2
Lots of less than 1 ton.....	12 1/2 @ 12 3/4
Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or mixed grades, 1% ; 25 bbls., 2% ; 50 bbls., 4%.....	
Dry Colors.....	per lb.
Black, Carbon.....	5 @ 10
Black Drop, American.....	4 @ 6
Black Drop, English.....	5 @ 15

Black, Ivory.....	per lb. 16 @ 20
Lamp, Coar.....	per lb. 4 1/2 @ 6
Blue, Celestial.....	per lb. 4 @ 6
Blue, Chinese.....	per lb. 29 @ 32
Blue, Prussian.....	per lb. 27 @ 30
Blue, Ultramarine.....	per lb. 4 1/2 @ 15
Brown, Spanish.....	per lb. 1 1/2 @ 1
Carmine, No. 40.....	per lb. \$3.00 @ 3.95
Green, Chrome, ordinary.....	per lb. 3 1/4 @ 6
Green, Chrome, pure.....	per lb. 17 @ 25
Lead, Red, bbls., 1/2 bbls. and kegs:	
Lots 500 lb or over.....	@ 7 1/4
Lots less than 500 lb.....	@ 7 1/2
Litharge, American, bbls.....	per lb. 7 1/4 @ 7 1/2
Ocher, American.....	per lb. 50 @ 60
American Golden.....	per lb. 2 1/2 @ 3 1/4
French.....	per lb. 1 1/4 @ 2 1/4
Foreign Golden.....	per lb. 3 @ 4
Orange Mineral, English.....	per lb. 10 @ 12
French.....	per lb. 10 1/2 @ 12
German.....	per lb. 8 1/2 @ 10
American.....	per lb. 8 1/2 @ 8 3/4
Red, Indian, English.....	per lb. 4 1/2 @ 8 1/2
American.....	per lb. 3 @ 3 1/4
Red, Turkey, English.....	per lb. 4 @ 10
Red, Turcan, English.....	per lb. 7 @ 10
Red, Venetian, Amer.....	per 100 lb. \$2.50 @ 2.25
English.....	per 100 lb. \$1.15 @ 1.75
Sienna, Italian, Burnt and Powdered.....	per lb. 3 @ 9 1/4
Italian, Raw, Powdered.....	per lb. 3 @ 6 1/2
American, Raw.....	per lb. 1 1/4 @ 2
American Burnt and Pow.....	per lb. 1 1/4 @ 2
Talc, French.....	per ton \$17.00 @ 25.00
American.....	per ton 17.00 @ 25.00
Terra Albs, French.....	per 100 lb. .30 @ 1.00
English.....	per 100 lb. .80 @ 1.00
American.....	per 100 lb. No. 1. .75 @ .80
American.....	per 100 lb. No. 2. .60 @ .65
Umber, Tkey, Bnt. & Pow.....	per lb. 2 1/4 @ 3 1/4
Turkey, Raw and Powdered.....	per lb. 2 1/4 @ 3 1/4
Burnt, American.....	per lb. 1 1/4 @ 2
Raw, American.....	per lb. 1 1/4 @ 2
Yellow Chrome.....	per lb. 12 @ 24
Vermilion, American Lead.....	per lb. 19 @ 25
Quicksilver, bulk.....	per lb. 65 @ 68
Quicksilver, bark.....	per lb. 65 @ 68
English, Imported.....	per lb. 65 @ 70
Chinese.....	per lb. \$2.90 @ 1.00

Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33% @ 33% & 10% signifies

that the price of the goods in question ranges from 33% per cent. discount to 33% and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1906, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters, Blind—

Domestic, # doz. \$3.00.....33%
North's.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....35%
Taplin's Perfection.....35%

Ammunition—See Caps, Cartridges, Shells, &c.

Anti-Rattlers—

Fernald Mfg. Co. Burton Anti-Rattlers, # doz. pairs, Nos. 1, \$0.75; 2, \$0.60; 4, \$1.00; 5, \$0.50.
Fernald Quick Shifter, # doz. pairs.....\$2.00@3.00

Anvils—American—

Eagle Anvils.....# 17 @ 74¢
Hay-Budden, Wrought.....# 18 @ 94¢
Trenton.....# 19 @ 94¢

Imported—

Peter Wright & Sons, # 18 to 349 lb. 11¢; 350 to 600 lb. 11¢.
Anvil, Vise and Drill—
Miller Falls Co., #18.00.....15¢10%

Apple Parers—See Parers.

Aprons, Blacksmiths'—

Livingston Nail Co.....33%

Augers and Bits—

Com. Double Spur.....75¢75¢10%
Jennings' Patn., reg. finish.....50¢10%
Black Lip or Blued.....60¢10%

Boring Mach. Augers.....70¢10%

Car Bits, 12-in. twist.....50¢10%

Ford's Auger and Car Bits.....40¢5%

Fl. Washington Auger Co., rad's.....35%

Forstner Pat. Auger Bits.....25%

C. E. Jennings & Co.:
No. 10 ext. lip, R. Jennings' list.....25%

No. 30, R. Jennings' list.....40¢10%

Russell Jennings.....25¢10¢10%

L'Hommedieu Car Bits.....45%

Mayhew's Countersink Bits.....45%

Pugh's Black.....20%

Pugh's Jennings' Pattern.....35%

Snell's Auger Bits.....60%

Snell's Bell Hangers' Bits.....60%

Snell's Car Bits, 12-in. twist.....60%

Snell's King Auger Bits.....60%

Wright's Jennings' Bits.....50%

Bit Stock Drills—

See Drills, Twist.

Expansive Bits—

Clark's small, #18; large, #26.....50¢10%

Clark's Pattern, No. 1, # doz. #26.....60¢10¢10%

No. 2, #18.....60¢10¢10%

C. E. Jennings & Co., Steer's Pat. #26.....60%

Lavigne Pat., small size, #18.00; large size, #26.00.....70¢10%

Swan's.....60%

Gimlet Bits—

Common Dble, Cut.....\$3.00@3.25

German Pattern, Nos. 1 to 10, \$4.75; 11 to 13, \$5.75

Hollow Augers—

Donney Pat., per doz. #5.50@6.00

Ames.....25¢10%

Universal.....25%

Wood's Universal.....25%

Ship Augers and Bits—

Ship Augers.....45¢5¢—

Ford's.....35¢5%

C. E. Jennings & Co.:
L'Hommedieu's.....15%

Watrous'.....35¢10%

Snell's.....40%

Awl Hatts—See Handles, Mechanics' Tool.

Awls—

Brad Awls:
Handled.....gro. \$2.75@3.00

Unhdd, Shldered.....gro. \$3.00@3.25

Unhanded, Patent.....gro. \$3.00@3.25

Peg Awls:

Unhanded, Patent.....gro. \$1.00@1.25

Unhdd, Shldered.....gro. \$1.00@1.25

Scratch Awls:

Handled, Com.....gro. \$3.50@4.00

Handled, Socket.....gro. \$11.00@12.00

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

Single Bit, base weights: Per doz.
First Quality.....\$1.75@2.00

Second Quality.....\$1.25@1.50

Double Bit, base weights:
First Quality.....\$7.00@7.50

Second Quality.....\$6.50@7.00

Axle Grease—

See Grease, Axle

Axles—

Concord, Loose Collar.....4¢10¢10%

Concord, Solid Collar.....4¢10¢10%

No. 1 Common, Loose.....3¢10¢10%

No. 1 1/2 Com., New Styles.....4¢10¢10%

No. 2 Solid Collar.....4¢10¢10%

Half Patent:
Nos. 7, 8, 11 and 12.....75¢75¢5%

Nos. 13 to 14.....70¢10¢75¢5%

Nos. 15 to 18.....75¢10¢75¢10¢5%

Nos. 19 to 22.....75¢10¢75¢10¢5%

Boxes, Axle—

Common and Concord, not turned lb., 4¢10¢5%

Common and Concord, turned lb., 5¢10¢6%

Half Patent.....lb., 8¢10¢9%

Bait—

Hendryx:
A Bait.....20%

B Bait.....25%

Competitor Bait.....20¢5%

Balances—

Caldwell new list.....50%

Pullman.....50¢10¢60%

Spring—

Spring Balances.....50¢10¢60%

Chatillon's:
Light Spg. Balances.....50¢10%

Straight Balances.....40¢50%

Circular Balances.....50¢10%

Large Dial.....30%

Barb Wire—See Wire, Barb.

Bars—

Crow—
Steel Crowbars, 10 to 40 lb. per lb., 3¢10¢5%

No. 10 Ideal, Nickel Plate.....# gro. \$8.50

Beams, Scale—

Scale Beams.....40¢5¢10¢10%

Chatillon's No. 1.....30%

Chatillon's No. 2.....40%

Beaters, Carpet—

Holt-Lyon Co.:
No. 13 Wire Tinned # doz.....\$0.75

No. 12 Wire Coppered # doz.....\$0.75

Tinned.....\$0.85

No. 11 Wire Coppered # doz.....\$1.10

Tinned.....\$1.20

No. 10 Wire Galvanized.....# doz. \$1.50

Western W. G. Co.:
No. 1 Electric.....# gro. \$7.80

No. 2 Buffalo.....# gro. \$9.30

No. 3 Perfection Dust.....# gro. \$8.00

Egg—

Holt-Lyon Co.:
Holt, per doz., No. 5, \$0.80; No. 1, Jap'd, \$1.15; No. 1, Tin'd, \$1.40;

No. B, Jap'd, \$1.85; No. 2, Tin'd, \$2.25; No. 6, \$1.60.

Lyon, Jap'd, per doz., No. 2, \$1.30.

Taplin Mfg. Co.:
Improved Dover, per gro., No. 60, \$6.00; No. 75, \$6.50; No. 100, \$7.00;

No. 102, Tin'd, \$8.50; No. 150, Hotel, \$15.00; No. 182, Hotel, Tin'd, \$17.00; No. 200, Tumbler, \$8.50; No. 202, Tumbler, Tin'd, \$9.50; No. 300, Mammoth, per doz., \$25.00.

Turner & Seymour Mfg. Co.:
T. & S. Dover.....\$6.00

Western W. G. Co., # gro., Buffalo, No. 2, \$8.00; Perfection, No. 3, \$9.00.

Wonder (R. M. Co.), # gro. net, \$6.25

Bellows—

Blacksmith, Standard List.....60¢60¢10%

Hand—

Inch.....6 7 8 9 10

Doz.....\$4.75 5.70 6.63 7.60 8.55

Molders—

Inch.....9 10 11 12 14

Doz.....\$8.00 9.00 10.50 12.50 14.50

Bells—

Cow—
Ordinary Goods.....75¢5¢75¢10¢5%

High grade.....70¢10¢75%

Jersey.....75¢10%

Texas Star.....50%

Door—

Abbe's Gong.....45%

Barton Gong.....50%

Home, R. & E. Mfg. Co.'s.....55¢10%

Trip Gong.....50¢10¢50¢10¢5%

Yankee Gong.....50%

Hand—

Polished, Brass.....60¢10%

White Metal.....60%

Nickel Plated.....50¢10¢60%

Sticks.....50¢10¢50¢10¢5%

Cone's Globe Hand Bells.....33%@35%

Silver Chime.....33%@35%

Miscellaneous—

Farm Bells.....lb. 2¢10¢2¢10%

Church and School.....60%

American Tube & Stamping Co.
Gongs.....75%

Table Call Bells.....50¢50¢10%

Belting—

Leather—
Extra Heavy, Short Lap.....60¢5%

Regular Short Lap.....60¢10¢5%

Standard.....70%

Light Standard.....70¢5%

Cut Leather Lacing.....45%

Leather Lacing Slides, per sq. ft. 25¢

Rubber—

Agricultural (Low Grade).....75¢75¢5%

Common Standard.....70¢70¢10%

Standard.....60¢5¢60¢10%

Extra.....60¢60¢5%

High Grade.....50¢5¢50¢10%

Bench Stops—

See Stops, Bench

Benders and Upsetters,

Tire—
Detroit Perfected Tire Bender.....40%

Detroit Stoddard's Lightning Tire Upsetters, No. 1, \$4.25; No. 2, \$7.25;

No. 3, \$10.50; No. 4, \$16.25; No. 5, \$20.50.

Green River Tire Benders and Upsetters.....20%

Bicycle Goods—

John S. Long's Son & Co.'s 1906 list:
Chain, Parts, Spokes.....50%

Tubes.....60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See Augers and Bits.

Blocks—

Tackle—
Common Wooden.....75%

Hartz St. Tackle Blocks.....50¢50¢5%

B. & L. B. Co.:
Boston Wood Snatch, 50%; Eclipse Steel, 75%; Hollow Steel, 50¢10%;

Star Wire Rope, 50%; Tarbox Metal Snatch, 50%; Tarbox New Style Steel, 50¢10%; Wire Rope Snatch, 50%.

Lane's Patent Automatic Lock and Junior.....30%

Stowell's Novelty, Mal. Iron.....50%

Stowell's Loading.....50¢10%

See also Machines, Hoisting.

Boards, Stove—

Zinc, Crystal, &c.....40%

Paper Embossed.....40¢10%

Boards, Wash—

See Washboards.

Bobs, Plumb—

Penfield & Esser Co.....33%5%

Boils—

Carriage, Machine, &c.—
Common Carriage (cut thread):
% x 6 and smaller.....75¢—

Larger and Longer.....60¢10¢60¢10¢5%

Phila. Eagle, \$3.00 list May 21, '99

Bolt Ends.....65¢65¢5%

Machine, % x 4 and smaller.....75¢—

Machine, larger and longer.....65¢65¢5%

Door and Shutter—

Cast Iron Barrel, Japanned,
Round Brass Knob:
Inch.....3 4 5 6 8

Per doz. \$3.30 3.5 4.5 6.0 8.0

Cast Iron Spring Foot, Jap'd,
Inch.....6 8 10

Per doz.....\$1.20 1.50 2.25

Cast Iron Chain, Flat, Japanned,
Inch.....6 8 10

Per doz.....\$1.00 1.40 1.65

Cast Iron Flat Shutter, Jap'd,
Brass Knobs:
Inch.....6 8 10

Per doz.....\$0.75 1.35 1.25

Wrought Barrel Jap'd.....80¢80¢10%

Barrel Bronzed.....50¢50¢10%

Spring.....70¢10¢70¢10¢10%

Shutter.....50¢5¢50¢10¢5%

Square Neck.....75¢75¢10%

Calipers—See Compasses.**Calks, Toe and Heel—**

Blunt, 1 prong.....per lb. 4.45¢
 Sharp, 1 prong.....per lb. 4.45¢
 Burke's Blunt, 2 1/2".....per lb. 4.45¢
 Gaudier, Blunt, 2 1/2".....per lb. 4.45¢
 Perkins, Blunt, 2 1/2".....per lb. 4.45¢

Can Openers—

See Openers, Can.

Cans, Milk—

Illinois Pattern.....\$1.35 1.85 2.05 each.
 New York Pattern.....1.50 2.20 2.45 each.
 Baltimore Pattern.....1.50 2.20 2.45 each.
 Dubuque.....1.35 1.85 2.05 each.

Cans, Oil—

Buffalo Family Oil Cans:
 5 10 gal. 18.00 60.00 125.00 gro., net.

Caps, Percussion—

Eley's E. B.50¢ 55¢
 G. D.per M 35¢
 F. L.per M 40¢
 G. B.per M 45¢
 Musketper M 60¢

Primers—

Berdan Primers, \$2 per M.....80¢
 B. L. Caps (Sturtevant Shell).....80¢
 \$2 per M.....80¢
 All other primers per M \$1.50 @ 1.60

Cartridges—

Blank Cartridges:
 32 C. F., \$5.50.....10.45¢
 38 C. F., \$7.00.....10.45¢
 22 cal. Rim, \$1.50.....10.45¢
 32 cal. Rim, \$2.75.....10.45¢
 B. B. Caps, Con. Ball, \$1.00.....11.45¢
 B. B. Caps, Round Ball.....11.45¢
 Central Fire.....15.45¢
 Target and Sporting Rifle.....15.45¢
 Primed Shells and Bullets.....15.45¢
 Rim Fire, Sporting.....15.45¢
 Rim Fire, Military.....15.45¢

Casters—

Bed70¢ 70¢ 10¢
 Plate60¢ 10¢ 10¢ 10¢
 Philadelphia75¢ 75¢ 10¢
 Acme, Ball Bearing.....33.45¢
 Boss10.45¢
 Boss Anti-Friction.....10.45¢
 Gem (Roller Bearings).....45¢
 Martin's Patent (Phoenix).....45¢
 Standard Ball Bearing.....45¢
 Tucker's Patent low list.....30¢
 Yale (Double Wheel) low list.....50¢

Cattle Leaders—

See Leaders, Cattle.

Chain, Coil—

American Coil, Straight Link:
 5-16 1/4 5-16 3/4 7-16 1/2 9-16
 \$8.90 6.10 5.10 4.10 4.25 4.15 4.10
 5 3/4 7 1/2 to 1-16 1 1/2 to 1 1/4 inch.
 \$4.00 3.50 3.85 3.95
 German Coil.....60¢ 10¢ 10¢ 70¢

Halter—

Halter Chains.....60¢ 45¢ 60¢ 10¢
 German Pattern Halter Chains
 list July 21, '07.....60¢ 10¢ 10¢
 Covert Mfg. Co.
 Halter.....35¢ 45¢

Cow Ties—

See Halters and Ties.

Trace, Wagon, &c.—

Traces, Western Standard: 100 pr.
 6 1/2-8-2, Stright, with ring \$25.00
 6 1/2-8-2, Stright, with ring \$26.00
 6 1/2-8-2, Stright, with ring \$30.00
 6 1/2-10-2, Stright, with ring \$35.00
 NOTE—Add 2¢ per pair for Hooks.
 Traces: Add 4¢ per pair for Nos. 2
 and 3, 2¢; No. 1, 3¢; No. 0, 4¢ to price of
 Straight Link.

Eastern Standard Traces, Wag-
 on Chain, &c.....60¢ 10¢

Miscellaneous—

Jack Chain, list July 10, '05:
 Iron60¢ 10¢
 Brass60¢ 10¢
 Safety Chain.....70¢ 10¢
 Gal. Pump Chain.....10¢ 4 1/2¢
 Covert Mfg. Co.:
 Breast, Halter, Heel, Rein, Stal-
 lion40¢
 Oneida Community:
 Am. Dog Leads and Kennel Chains.
 Chains.....45¢ 60¢ 65¢
 Niagara Dog Leads and
 Chains.....45¢ 60¢ 65¢
 Wire Goods Co.:
 Dog Chain.....70¢ 10¢
 Universal Dbl.-Jointed Chain.....50¢

Chain and Ribbon, Sash—

Oneida Community:
 Copper Chain, 60¢ 55¢; Steel Chain,
 60¢
 Pullman:
 Bronze Chain, 60¢; Steel Chain,
 60¢ 10¢
 Sash Chain Attachments, per set, 8¢
 Aluminum Sash Ribbon, per 100
 ft.....\$1.25 @ \$3.00
 Sash Ribbon Attachments, per set, 8¢

Chalk—(From Jobbers.)

Carpenters' Blue.....45¢ @
 Carpenters' Red.....40¢ @
 Carpenters' White.....35¢ @
 Some jobbers sell at lower prices
 than above.

Checks, Door—

Bardley's45¢
 Pullman, per gro.....\$51.00
 Russwin33.45¢

Chests, Tool—

American Tool Chest Co.:
 Boys' Chests, with Tools.....35¢
 Youths' Chests, with Tools.....40¢
 Gentlemen's Chests, with Tools.....30¢
 Farmers', Carpenters', etc., Chests,
 with Tools.....20¢

Machinists' and Pipe Fitters'
 Chests, Empty.....50¢
 Tool Cabinets.....50¢
 C. E. Jennings & Co.'s Machinists'
 Tool Chests.....33¢ 10¢

Chisels—**Socket Framing and Firmer**

Standard List.....75¢ 10¢ 75¢ 10¢ 65¢
 Buck Bros.....30¢
 Charles Buck Edge Tool Co.....30¢
 C. E. Jennings & Co.:
 Socket Firmer No. 10.....60¢
 Socket Framing No. 15.....60¢
 Swan's.....75¢
 L. & I. J. White Co.....30¢ 30¢ 45¢

Tanged—

Tanged Firmers.....33 1-3¢ 10¢
 Buck Bros.....30¢
 Charles Buck Edge Tool Co.....30¢
 C. E. Jennings & Co. No. 191.....25¢
 L. & I. J. White Co.....25¢ 5¢

Cold—

Cold Chisels, good quality.....13¢ 15¢
 Cold Chisels, fair quality.....11¢ 12¢
 Cold Chisels, ordinary.....9¢ 10¢

Chucks—

Almond Drill Chucks.....35¢
 Almond Turret Six-Tool Chuck.....35¢
 Beach Pat., each \$8.00.....35.45¢
 Empire.....25¢
 Blacksmiths'.....25¢
 Jacobs' Drill Chucks.....25¢
 Pratt's Positive Drive.....25¢
 Independent Lathe Chucks.....40¢
 Universal, Reversible Jaws.....40¢
 Combination, Reversible Jaws.....40¢
 Drill Chucks, New Model, 25¢:
 Standard, 40¢ 10¢; Skinner Pat.,
 25¢; Positive Drive.....50¢
 Planer Chucks.....50¢
 Face Plate Jaws.....40¢
 Standard Tool Co.:
 Improved Drill Chuck.....45¢
 Union Mfg. Co.:
 Combination, Nos. 1, 2, 3, 4, 5, 6,
 7, 8 and 17, 40¢; No. 21.....30¢
 Scroll Combination, Nos. 82 and
 84.....30¢
 Geared Scroll, Nos. 33, 34 and 35.....35¢
 Independent Iron, Nos. 18 and 318.....40¢
 Independent Steel, No. 64.....30¢
 Union Drill, Nos. 000, 00, 100, 101,
 102, 103, 104.....25¢
 Union Car Drill.....25¢
 Universal 11, 12, 16, 17, 13, 14, 15, 40¢
 Universal, No. 42.....35¢
 Iron Face Plate Jaws, Nos. 28, 30,
 48 and 50.....40¢
 Steel Face Plate Jaws, Nos. 70 and
 72.....35¢
 Westcott Patent Chucks:
 Lathe Chucks.....50¢
 Little Giant Auxiliary Drill.....50¢
 Little Giant Double Grip Drill.....50¢
 Little Giant Drill, Improved.....50¢
 Oneida Drill.....50¢
 Scroll Combination Lathe.....50¢

Clamps—

Adjustable, Hammer's.....20¢ 20¢ 45¢
 Carriage Makers', P., S. & W.
 Co.....40¢ 10¢ 50¢
 Besly, Parallel.....33¢ 10¢
 Lineman's, Utica Drop Forge & Tool
 Co.....40¢
 Wood Workers, Hammer's.....40¢ 10¢
 Saw Clamps, see Vises, Saw Filers.

Cleaners, Drain—

Iwan's Champion, Adjustable.....55¢
 Iwan's Champion, Stationary.....45¢

Sidewalk—

Star Socket, All Steel.....30 doz. \$4.05 net
 Star Shank, All Steel.....\$1.24 net
 W. & C. Shank, All Steel.....\$1 doz.
 7 1/2 in., \$3.00; 8 in., \$3.25.

Cleavers, Butchers'—

Foster Bros.....30¢
 Fayette R. Plumb.....30¢
 L. & I. J. White Co.....30¢

Clippers, Horse and Sheep—

Chicago Flexible Shaft Company:
 '98 Chicago Horse, each.....\$8.75
 1902 Chicago Horse, each.....\$10.75
 20th Century Horse, each.....\$5.00
 Lightning Belt Horse, each.....\$15.00
 Chicago Belt Horse, each.....\$20.00
 Stewart's Enclosed Gear
 Horse, each.....\$4.75
 Stewart's Patent Sheep Shear-
 ing Machine, each.....\$12.75

Clips, Axle—

Regular Styles, list July 1, '05.80¢

Cloth and Netting, Wire

—See Wire, &c.

Cocks, Brass—

Hardware list:
 Plain Bibbs, Globe, Kerosene,
 Racking, Liquor, Bottling,
 &c.....70¢
 Compression Bibbs.....65¢ 10¢

Coffee Mills—

See Mills, Coffee.

Collars, Dog—

Nickel Chain, Walter B. Stevens &
 Son's list.....40¢
 Leather, Walter B. Stevens & Son's
 list.....40¢

Combs, Curry—

Metal Stamping Co.....40¢

Compasses, Dividers, &c.

Ordinary Goods.....70¢ 10¢ 75¢
 Remis & Call Hdw. & Tool Co.:
 Dividers.....65¢
 Calipers, Double, 65¢; Inside or
 Outside.....65¢
 Calipers, Wing.....40¢
 Compasses.....50¢
 Wm. Schollhorn Co.:
 Excelsior Dividers.....55¢
 Lodi Dividers.....75¢

Conductor Pipe,—

L. O. L. to Dealers:

Galv.	Charcoal	Copper.
Steel.	Iron.	14, 16 & 20 oz.
Eastern:	60¢ 30¢	60¢ 2 1/2¢ 30¢ 10¢ 2 1/2¢
Central:	70¢	55¢ 7 1/2¢ 30¢ 10¢
Western and Southern:	65¢ 10¢	55¢ 2 1/2¢ 30¢ 7 1/2¢
So. Western:	62 1/2¢ 7 1/2¢	50¢ 65¢ 30¢ 65¢

Terms, 60 days; 25¢ cash 10 days. Fac-
 tory shipments generally delivered.
 See also Eave Troughs.

Coolers, Water—

Gal, each.....2 3 4 6 8
 Labrador.....\$1.20 \$1.50 \$1.80 \$2.10 \$2.70
 Iceland, ea.....\$1.80 \$2.10 \$2.40 \$3.00
 Gal.....2 3 4 6 8
 Galvanized, ea.....\$1.85 \$2.00 \$2.25 \$2.90 \$3.90
 Galvanized, Lined, side handles,
 Gal.....2 3 4 6 8
 Each.....\$1.95 \$2.15 \$2.40 \$3.30 \$4.15
 White Enameled, 25¢; Agate Lined, 25¢

Coopers' Tools—

See Tools, Coopers'.

Coppers' Soldering—

Soldering Coppers, 3 lbs. to pair
 and heavier, 25¢; lighter than
 3 lb. to pair.....25¢

Cord— Sash—

Braided, Drab.....10¢ 10¢ 10¢ 10¢
 Braided, White, Com., Nos. 8
 to 12, 2 1/2¢; No. 7, 2 1/4¢; No. 6,
 2 1/2¢.

Cable Laid Italian—

10¢, A, 18¢; B, 16¢
 Common India.....10¢ 10¢ 10¢ 10¢
 Cotton Sash Cord, Twisted.....17¢ 10¢
 Patent Russia.....10¢ 10¢ 10¢ 10¢
 Cable Laid Russia.....10¢ 10¢ 10¢ 10¢
 India Hemp, Br'd'd.....10¢ 10¢ 10¢ 10¢
 India Hemp, Twisted.....10¢ 10¢ 10¢ 10¢
 Patent India, Twisted.....10¢ 10¢ 10¢ 10¢
 Anniston Cordage Co.:
 Braided, Nos. 8 to 12, 30¢ 24¢; No. 7,
 30¢ 24¢; No. 6, 30¢ 25¢; 50 ft.,
 50¢; 100 ft., 100¢; 150 ft., 150¢.
 Oriole, \$2.00; 50 ft., Columbia, \$0.85;
 50 ft., Victoria, \$1.00; 50 ft., 6-Thread,
 \$1.10; 60 ft., 3-Thread, \$0.95; 50 ft.,
 Manila, \$1.40; 60 ft., Jute, \$0.75.
 Pearl Braided, cotton, No. 6, 30¢ lb.
 25¢ lb.; No. 7, 25¢; No. 8 to 12, 24¢ lb.
 Eddystone Braided, Nos. 8 to 10,
 25¢; 7, 25¢; 6, 26¢ lb.
 Harmony Cable Laid Italian, Nos. 7
 to 10.....10¢ 10¢ 10¢ 10¢
 Pullman:
 Wire Sash Cord.....10¢
 Sash Cord Attachments, per doz. 10¢
 Samson, Nos. 8 to 12:
 Braided, 50¢ lb., Drab Cotton,
 55¢; Italian Hemp, 40¢ @
 55¢; Linen, 65¢; White Cot-
 ton, 50¢; Spot Cord.....50¢
 Massachusetts, Drab.....10¢ 45¢
 No. 7, 25¢; No. 6, 30¢;
 Phoenix, White, Nos. 8 to 12, 27¢;
 Silver Lake, per lb.:
 A, Drab, 45¢; A, White, 40¢;
 B, Drab, 40¢; B, White, 35¢;
 Italian Hemp, 40¢; Linen.....57¢ lb.
 See also Chain and Ribbon.

Wire, Picture—

List July 10, 1906.....35¢ 10¢ 10¢ @
 Hendry Standard Wire Picture Cord,
 old list, 85¢ 10¢

Cradles—

Grain40¢ 12 1/2¢

Crays—

White Round Crays, Cases, 100
 gro., \$6.50 @ \$7.50 at factory, but
 lower prices made by jobbers
 Zelnicker's Lumber, 50 gro.
 White and Purple, Indelible.....\$7.50
 Blue, Red, Green, Yellow and
 Terra Cotta, \$4.50; Black.....\$4.00
 Genuine Soapstone, Metal Workers',
 5 in. x 3/4 in. Round, \$2.50; 5 in. x
 1/2 in. Square, \$1.75; 5 x 3/4 x 3-16.....\$3.00
 5 x 1 1/4 x 3-16.....\$3.00

Crooks, Shepherds'—

Fort Madison, per doz., Heavy, \$7.00;
 Light.....\$4.50

Crow Bars—See Bars, Croic.**Cultivators—**

Victor Garden.....50¢

Cutlery, Table—

International Silver Company:
 No. 12 M'd'm Knives, 1817, 40 doz. \$3.50
 Star, Eagle, Rogers & Hamilton
 and Anchor.....40 doz. \$3.00
 Wm. Rogers & Son.....40 doz. \$2.50

Cutters—Glass—

H. B. Mayhew Co.....40¢
 Red Devil.....50¢
 Smith & Hemenway Co.....50¢
 Woodward.....40¢

Meat and Food—

American.....30¢
 No. 1.....2 3 4 5 6 7 8 9 10 11 12
 Each.....\$5 \$7 \$10 \$15 \$25 \$50 \$60
 Enterprise:
 No. 1.....\$3 \$5 \$12 \$22 \$32
 Each.....\$2 \$3 \$2.75 \$4.50 \$6 \$25 @ \$25 @ 7 1/2¢
 No. 202, \$1.50.....40¢ 7 1/2¢
 Dixon's.....40¢ doz. 30¢ 30¢ 45¢
 Nos.....1 2 3 4
 \$14.00 \$17.00 \$19.00 \$30.00
 Ideal.....40¢ 40¢ 45¢
 Little Giant.....40¢ doz. 40¢ 50¢
 No. 335, \$10.....312 320 322
 No. 335, \$10.....\$18.00 \$14.00 \$72.00 \$68.00
 N. E. Food Choppers.....25¢
 New Triumph No. 605, 40 doz. \$24.00
 Russwin Food, No. 1, \$24.00; No. 2,
 \$27
 Woodruff's.....40¢ doz. 30¢ 30¢ 45¢
 Nos.....100 150
 Enterprise Beef Shavers.....25¢ 30¢

Slaw and Kraut—

Henry Disston & Son:
 Slaw and Kraut Cutters, Corn
 Graters, &c.....35¢
 J. M. Mast Mfg. Co.:
 Slaw Cutters, 1 Knife.....40¢ doz. \$3.00
 Combined Slaw Cutter and Corn
 Grater.....40¢ doz. \$4.00
 Tucker & Dorsey Mfg. Co.:
 Kraut Cutters.....40¢
 Slaw Cutters, 1 Knife.....40¢ gr. \$18 @ \$20
 Slaw Cutters, 2 Knife.....40¢ gr. \$22 @ \$24

Tobacco—

All Iron, Cheap.....\$1.25 @ \$1.50
 Enterprise.....25¢ 30¢
 National, 40 doz., No. 1, \$21; No. 2,
 \$18.....40¢

Diggers, Post Hole, &c.—

Disston's:
 Rapid, 40 doz., \$24.00.....25¢
 Samson, 40 doz., \$34.00.....25¢
 Iwan's Imp'd Post Hole Auger.....40¢
 Vaughan Pattern Post Hole Augers,
 40 doz., \$6.25
 Perfection Post Hole Diggers, 40
 doz., \$8.25
 Split Handle Post Hole Diggers,
 40 doz., \$7.25
 Kohler's, 40 doz., Universal, \$14.00;
 Little Giant, \$12.00; Hercules,
 \$10.00; Invincible, \$9.00; Rival,
 \$8.00; Pioneer.....\$7.00
 Never-Break Post Hole Diggers, 40
 doz., \$24.00.....60¢

Dividers—See Compasses.**Drawers, Money—**

Tucker's Pat. Alarm Till No. 1, 40
 doz., \$18; No. 2, \$15; No. 3, \$12;
 No. 4, \$18.

Drawing Knives—

See Knives, Drawing.

Dressers, Emery Wheel—

Diamond Emery Wheel Dressers.....35¢
 Diamond Wheel Dresser Cutters.....35¢

Drills and Drill Stocks—

Blacksmiths' Common Drilling
 Machines.....\$1.50 @ \$1.75
 Breast, Miller Falls.....10¢ 10¢
 Breast, P. S. & W.....10¢ 10¢
 Goodell Automatic Drills, 40 & 50 @ 10¢ 10¢
 Johnson's Automatic Drills, Nos. 2
 and 3.....16¢
 Johnson's Drill Points.....16¢
 Miller Falls Automatic Drills.....30¢ 10¢
 Ratchet, Curtis & Curtis.....40¢
 Ratchet, Parker's.....40¢
 Ratchet, Weston's.....40¢
 Ratchet, Weston's, Style H Im-
 proved.....40¢
 Ratchet, No. 012.....40¢
 Ratchet, Celebrated.....40¢
 Ratchet, Whitney's, P. S. & W. 50¢
 Whitney's Hand Drill, No. 1, \$10.00;
 Adjustable, No. 10, \$12.00.....33 1/2¢

Twist Drills—

Bit Stock.....60¢ 10¢ 10¢ 70¢
 Taper and Straight Shank.....60¢ 10¢ 60¢ 10¢ 45¢

Drivers, Screw—

Screw Driver Bits, per doz. 45¢ @ 50¢
 Balsey's Screw Holder and Driver, 40
 doz., 2 1/2-in., \$8; 4-in., \$7.50; 5-in.,
 \$7.....50¢
 Buck Bros' Screw Driver Bits.....30¢
 Champion.....30¢
 Disston's.....70¢
 Edison.....60¢
 Fray's Hol. H'dle Sets, No. 3, \$12.50;
 Ford's Brace Screw Drivers.....40¢ 10¢
 Gay's Double Action Ratchet.....35¢
 Goodell's Auto.....50¢ 10¢ 10¢ 50¢ 10¢ 10¢ 45¢
 Hurwood.....40¢
 Mayhew's Black Handle.....40¢
 Mayhew's Monarch.....40¢ 10¢
 Miller Falls, Nos. 20 and 21.....45¢ 10¢
 Miller Falls, No. 11, 12, 41, 42, 15¢ 10¢
 New England Specialty Co.....50¢ 10¢
 Smith & Hemenway Co., Never-
 turn, 40 & 55¢; Elmora.....50¢
 H. D. Smith & Co.'s Perfect H'dle.....40¢
 Stanley B. & L. Co.:
 No. 64, Varn. Handles, 60¢ 10¢; No.
 80, 70¢; Defiance, 70¢; Hurwood,
 55¢
 Swan's:
 Nos. 7565 to 7568, 50¢; No. 7540,
 40¢ 10¢

Eave Trough, Galvanized—

Territory. L. C. L. Galvanized
 Galv. Charcoal Copper.
 Steel. Iron. 14, 16 & 20 oz.

Eastern:

80¢ 70¢ 45¢ 30¢ 10¢

Extractors, Lemon Juice

Fasteners, Blind—
—See Squeezers, Lemon.

Zimmerman's 50¢10%
Wallings 40¢10%

Cord and Weight—

Ives 33%4

Faucets—

Cork Lined 50¢50¢10%
Metallic Key, Leather Lined.....

Red Cedar 60¢10¢70%
Petroleum 70¢10¢75%

B. & L. H. Co.:
Star 60¢

West Lock 50¢10%
John Sommer's Peerless Tin Key.....

John Sommer's Boss Tin Key.....

John Sommer's Victor Mtl. Key.....

John Sommer's Duplex Metal Key.....

John Sommer's Diamond Lock.....

John Sommer's I. X. L. Cork Lined.....

John Sommer's Reliable Cork Lined.....

John Sommer's Chicago Cork Lined.....

John Sommer's O. K. Cork Lined.....

John Sommer's No Brand, Cedar.....

John Sommer's Perfection, Cedar.....

McKenna, Brass:
Burglar Proof, N. P. 25%

Improved, 1/2 and 1 inch..... 25%

Self Measuring:
Enterprise, 1/2 doz. \$36.00..... 40¢10%

Lane's, 1/2 doz. \$36.00..... 40¢10%

National Measuring, 1/2 doz. \$36.00..... 40¢10%

Felloe Plates—

See Plates, Felloe.

Files— Domestic—

List Nov. 1, 1899.

Best Brands 70¢10¢75¢10%
Standard Brands 75¢10¢75¢10%
Lower Grade 75¢10¢10¢80¢10%

Imported:
Stubs' Tapers, Stubs' list, July 21, '97..... 33 1-3¢40%

Fixtures, Fire Door—

Richards Mfg. Co.:
Universal, No. 103; Special, No. 104..... 33.75

Fusible Links, No. 96..... 50%

Expansion Bolts, No. 107..... 60¢10%

Grindstone—

Net Prices:
Inch 15 17 19 \$1

Per doz. \$3.25 3.75 4.25 4.75

P. & S. W. Co. 30¢10%
Bushing Hardware Co. 60%

Stowell's Giant Grindstone Hanger, 1/2 doz. \$6.00

Stowell's Grindstone Fixtures, Extra Heavy, 40¢10%; Light..... 50%

Fodder Squeezers—

See Compressors.

Forks—

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Iowa Dig-Easy Potato..... 60¢10%
Victor, Hay..... 60¢15¢20%
Victor, Manure..... 60%

Victor, Header..... 60%

Champion, Hay..... 60%

Champion, Header..... 60%

Columbia, Hay..... 60¢15¢20%
Columbia, Manure..... 60%

Columbia, Spading..... 70¢12%
Hawkeye Wood Barley..... 60%

W. & C. Potato Digger..... 60¢10%
Acme Hay..... 60¢10%
Acme Manure, 4 line..... 60¢10%
Dakota Header..... 60¢20%
Jackson Steel Barley..... 60¢20%
Kansas Header..... 60%

W. & C. Favorite Wood Barley..... 60%

Plated.—See Spoons.

Frames— Saw—

White, 8'g't Bar, per doz. 75¢80¢

Red, 8'g't Bar, per doz. \$1.00¢1.15

Red, Dbl. Bruce, per doz. \$1.40¢1.50

Freezers, Ice Cream—

Qt. 1 2 3 4 6

Each \$1.90 \$1.60 \$1.90 \$2.20 \$2.80

Fruit and Jelly Presses—

See Presses, Fruit and Jelly.

Fry Pans—See Pans, Fry.**Fuse—**

Per 1000 Feet.
Hemp \$2.75

Cotton 3.20

Waterproof Sgl. Taped. 3.65

Waterproof Dbl. Taped. 4.10

Waterproof Tpl. Taped. 5.15

10¢5¢1/4%
10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

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10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

10¢5¢1/4%

Gimlets— Single Cut—

Numbered assortments, per gro.

Nail, Metal, No. 1, \$2.00; 2, \$2.30

Spike, Metal, No. 1, \$4.00; 2, \$4.30

Nail, Wood Handled, No. 1, \$2.30; 2, \$2.60

Spike, Wood Handled, No. 1, \$4.30; 2, \$4.60

Glass, American Window

See Trade Report.

Glasses, Level—

Chapin-Stephens Co. 60¢60¢10%

Glue, Liquid Fish—

Bottles or Cans, with Brush..... 25¢10¢50%

International Glue Co. (Marin's)..... 40%

Grease, Axle—

Common Grade..... gro. \$4.50¢6.00

Dixon's Everlasting, 10-lb pails, ea. 85¢; in boxes, 1/2 doz., 1 lb. \$1.20;

2 lb. \$2.00

Helmet Hard Oil..... 25%

Gridles, Soapstone—

Pike Mfg. Co. 33%¢33%¢10%

Grindstones—

Bicycle Emery Grinder..... \$6.50

Bicycle Grindstones, each..... \$2.50¢3.00

Pike Mfg. Co.:
Improved Family Grindstones, 1/2 inch, 1/2 doz., \$2.00..... 33%4

Royal Mfg. Co.:
Alumund Grinding Machines, each, Nos. 01, \$1.75; 1A, \$2.50; 10, \$5.00

Alumund Sickle Grinders, each, Nos. 2A, \$6.00; 20A Combined, \$6.50

Alumund Disc Grinders, each, \$2.50 30%

Grips, Nipple—

Perfect Nipple Grips..... 40¢10¢2%

Halters and Ties—

Cow Ties 60¢10¢60¢10¢45%

Covert Mfg. Co.:
Web 30¢2%

Jute Rope..... 20%

Sisal Rope..... 20%

Cotton Rope..... 45%

Hemp Rope..... 45%

Onelida Community:
Am. Coil and Halters..... 40¢40¢2%

Am. Cow Ties..... 45¢50%

Niagara Coil and Halters..... 45¢50%

Niagara Cow Ties..... 45¢50¢10¢45%

Hammers—**Handled Hammers—**

Heller's Machinists' 55¢10¢55¢10¢45%

Heller's Farriers' 40¢50¢10¢10¢45%

Magnetic Tack, Nos. 1, 2, 3, \$1.25; \$1.50, \$1.75..... 50%

Peck, Stow & Wilcox, Steel..... 50%

Fayette H. Plumb:
Plumb, A. E. Nail..... 40¢2%¢40¢12%4%

Engineers' and B. E. Hand..... 50¢12%¢60%

Machinists' Hammers..... 50¢15¢60¢5%

Riveting and Timmers..... 40¢2%¢40¢12%4%

Heavy Hammers and Sledges—

Under 3 lb., per lb., 50¢. 80¢10¢45%

3 to 5 lb., per lb., 40¢. 50¢10¢45%

Over 5 lb., per lb., 30¢. 80¢10¢10¢45%

Wilkinson's Smiths'..... lb. 9%¢10%4%

Handles—

Agricultural Tool Handles
Axe, Pick, etc. 60¢10¢60¢10¢45%

Hoe, Rake, etc. 45¢50%

Fork, Shovel, Spade, etc. 45¢50%

Long Handles..... 45¢50%

D Handles..... 50¢10¢45%

Cross-Cut Saw Handles—

Atkins' 40%

Champion 50%

Disston's 50%

Mechanics' Tool Handles—

Auger, assorted..... gro. \$2.50¢3.00

Brad Axl. \$1.65¢1.75

Chisel Handles, Ass'd, per gro.:
Tanged Firmer, Apple, \$2.40¢

\$2.65; Hickory..... \$2.15¢2.40

Socket Firming, Apple, \$1.75¢

\$1.95; Hickory..... \$1.45¢1.60

Socket Framing, Hickory, per gro. \$1.60¢1.75

File, assorted..... gro. \$1.30¢1.45

Hammer, Hatchet, etc. 60¢10¢60¢10¢45%

Hand Saw, Varished, doz. 80¢85¢; Not Varished..... 65¢75¢

Plane Handles:
Jack, doz. 30¢; Jack, Bolted 75¢

Fore, doz. 45¢; Fore, Bolted 90¢

Chapin-Stephens Co.:
Carving Tool..... 40¢40¢10%

Chisel 65¢65¢10%

File and Awl..... 65¢65¢10%

Saw and Plane..... 40¢40¢10%

Screw Driver..... 40¢40¢10%

Millers Falls Adj. and Ratchet Anvil Handles..... 20¢10%

Nicholson Simplicity File Handle..... \$1.00¢1.50

Hangers—

NOTE.—Barn Door Hangers are generally quoted per pair, without track, and Parlor Door Hangers per double set with track, etc.

Allith Mfg. Co.:
Reliable, No. 1; Allith, No. 3; A1-High Adjustable, No. 6; Reliable Parlor Door..... 50%

Chicago Spring Butt Co.:
Oscillating 25%

Big Twin..... 25%

Chisholm & Moore Mfg. Co.:
Baggage Car Door..... 50%

Elevator 30%

Railroad 50%

Cronk & Carrier Mfg. Co.:
Loose Axle..... 60¢10%

Roller Bearing..... 70%

Griffin Mfg. Co.:
Solid Axle, No. 10, \$12.00..... 70%

Roller Bearing, No. 11, \$15.00..... 70%

Roller Bearing, Ex. Hy., No. 2, \$18.00..... 70%

Hinged Hangers, \$16.00..... 60¢10%

Lane Bros. Co.:
Parlor, Ball Bearing, \$1.00;

Standard, \$3.15; No. 105, \$2.85;

New Model, \$2.80; New Cham-

pion Door, Standard..... \$2.25

Hinged 60¢45%

Covered 60¢2%

Special 70¢45%

Lawrence Bros.:
Advance and Sterling..... 60¢2%4%

Cleveland and Peerless..... 70¢45%

Clippier, No. 75..... 60¢45%

Crown 60¢2%4%

Cyclone-Tandem net \$7.50

Easy Parlor Door, Dbl. Sets, \$2.50; Single Sets, \$1.25..... 60%

Hummer 70¢45%

New Cyclone, Flexible, \$16.00..... 60¢45%

New York..... 60¢45%

McKinney Mfg. Co.:
No. 1, Special, \$10.10..... 40¢10%

No. 2, Standard, \$18..... 60¢10%

Hinged Hangers, \$16..... 50%

Meyers Stayon Hangers..... 60¢45%

Richards Mfg. Co.:
Hangers, Nos. 47, 42, 147, 217, 60¢45%

Pioneer Wood Track, No. 3, \$2.25

Roller B'r'g St'l Track No. 12, \$2.25

Roller B'r'g St'l Track No. 13, \$2.50

Roller B'r'g, Nos. 39, 41, 43, 70¢7%4%

Hero, Adj. Track No. 19, 50¢10%

Adjustable Track Tandem Trolley Track No. 16..... 50¢10%

Steel Track No. 8..... 50¢10%

Auto Adj. Track No. 22..... 50¢45%

Trolley B. D. No. 17, \$1.25; F. D. No. 129, \$2.25; No. 121, \$2.45; No. 150..... \$2.50

Safety Underwriters F. D. No. 101..... 50%

Tandem No. 41, 3% and 3 60¢10%

Palace, Adjustable Track No. 132..... 50¢45%

Royal, Adjustable Track No. 122..... 50¢10%

Ives' Wood Track No. 1..... \$2.25

Trolley B. D. No. 20..... 50¢10%

Trolley B. D. No. 24, \$1.30; No. 27, \$1.40; No. 28..... \$1.60

Roller Bearings, Nos. 37, 38, 39, 41, 43, 44, Sizes 1 and 2, 70¢7%4%

Anti-friction, No. 42; No. 44, sizes 2% and 3..... 60%

Hinged Tandem No. 48..... 60¢45%

Folding Door B. B. Swivel No. 135..... 40%

Stowell Mfg. & Foundry Co.:
Acme Parlor Ball Bearing..... 30%

Ajax Hinge Door..... 60%

Apex Parlor Door..... 50¢10¢45%

Atlas 60%

Screw Hook and Eye:

1/2 to 1 inch.....	lb. 5¢
1 1/2-inch.....	lb. 7¢
2-inch.....	lb. 8¢

Hitchers, Stall—

Covert Mfg. Co., Stall Hitchers. 30&2%

Hods— Coal—

Inch.....	15	16	17	18
Gale, Open.....	\$2.50	2.75	3.00	3.25
Jap. Open.....	\$1.90	2.10	2.25	2.55
Gale, Funnel.....	\$3.00	3.30	3.60	3.90
Jap. Funnel.....	\$2.45	2.65	2.85	3.30

Masons' Etc.—Cleveland Wire Spring Co.:
Steel Brick, No. 102.....each \$1.05
Steel Mortar, No. 158.....each \$1.35**Hoes— Eye—**Scovill and Oval Pattern.....
60&100 to 60&10&10%
Grub, list Feb. 23, 1899.....
70&100 to 75&10%
D. & H. Scovill.....30%**Handled—**

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1904, or selling at net prices.

Cronk's Weeding, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000
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Hoisting Apparatus—

See Machines, Hoisting.

Holders— Bit—

Angular, 1/2 doz. \$24.00.....45&10%

Door—Bardale's.....45%
Empire.....50%
Pullman.....55%
Superior.....33&1/2%**File and Tool—**

Nicholson File Holders and File Handles.....33&1/2%

Fruit Jar—

Triumph Fruit Jar Holder, 1/2 gross, \$10.00; 1/2 doz. \$1.25

Trace and Rein—

Fernald Double Trace Holder, 1/2 doz. \$1.25

Dash Rein Holder, 1/2 doz. \$1.25

Hones—Razor—

Pike Mfg. Co., Belgian, German and Swat.....50%

Hooks—Cast Iron—Bird Cage, Reading.....40%
Clothes Line, Reading List.....70%
Clothes Line, Stowell's.....45&20%
Coat and Hat, Reading.....45&20%
Coat and Hat, Stowell's.....70%
Coat and Hat, Wrightsville.....65%
Harness, Reading List.....40%
Harness, Stowell's.....50%
School House, Stowell's.....70%**Wire—**Belt.....80&100 to 2%
Wire C. & H. Hooks.....75&100 to 75&10&10%
Columbian Hdw. Co. Genl.....70&10%
Parker Wire Goods Co., King.....70&10%
Western W. G. Co., Molding.....75%
Wire Goods Co.:
Acme, 60&10%; Chief, 70%; Crown, 75%; Czar, 65%; V. Brace, 75%; Czar Harness, 50&10%.**Wrought Iron—**

Box, 6 in., per doz., \$1.00; 8 in., \$1.25; 10 in., \$1.50.

Cotton.....doz. \$1.05 to \$1.25

Wrought Staples, Hooks, &c.—See Wrought Goods

Miscellaneous—

Hooks, Bench, see Stops, Bench.

Bush, Light, doz. \$1.75; Medium, \$3.35; Heavy, \$5.25

Grass, best, all sizes, per doz. \$1.60

Grass, common grades, all sizes, per doz. \$1.39

Whiffletree.....lb. 5¢ to 8¢

Hooks and Eyes:
Brass.....60&5 to 60&10&5%
Malleable Iron.....70&70&10%
Covert Mfg. Co. Gate and Scuttle Hooks.....40%
Ft. Madison Cut-Easy Corn Hooks, 1/2 doz. \$3.25 net

Bench Hooks—See Bench Stops.

Corn Hooks—See Knives, Corn.

Horse Nails—

See Nails, Horses.

Horseshoes—

(See Shoes, Horses.)

Hose, Rubber—

Garden Hose, 1/2-inch:

Competition.....ft. 5 @ 6¢

3-ply Guaranteed.....ft. 8 @ 9¢

4-ply Guaranteed.....ft. 10 @ 11¢

Cotton Garden, 1/2-in., coupled:

Low Grade.....ft. 8 @ 9¢

Fair Quality.....ft. 10 @ 11¢

Irons— Sad—

From 1 to 10.....lb. 3 @ 3¢

R. B. Sad Irons.....lb. 3¢ to 4¢

Mrs. Potts' cents per set:

Nos. 50 55 60 65

Jap'd Tops.....65 62 75 73

Tin'd Tops.....70 67 80 77

New England Pressing, lb. 3¢ to 4¢

Pinking—

Pinking Irons.....doz. 40¢

Irons, Soldering

See Copiers.

Jacks, Wagon—Covert Mfg. Co.:
Auto Screw.....30&2%; Steel, 45%
Lockport.....50%
Lane's Steel.....30&10&2%
Richards' Tiger Steel, No. 130.....50&10%
Smith & Hemenway Co.'s.....35%**Kettles—**Brass, Spun, Plain.....80&25%
Enamelled and Cast Iron—See Ware, Hollow.**Knives—**Butcher, Kitchen, &c.—
Foster Bros' Butcher, &c.....30%
Wilkinson Shear & Cutlery Co.....60%**Corn—**Wilkinson Shear & Cutlery Co.,
Whitcomb Brand Knives and Hooks, 60%
Wilmington Acme, 1/2 doz. \$2.65;
Dent, \$2.75; Adj. Serrated, \$2.20;
Serrated, \$2.10; Yankee No. 1, \$1.50;
Yankee No. 2, \$1.15.**Drawing—**Standard List.....75&5 to 75&10%
C. E. Jennings & Co., Nos. 45, 46, 60,
Jennings & Griffin, Nos. 41, 42.....75%
Swan's.....70%
Watrous.....10%
L. & I. J. White.....20&5 to 25%
Hay and Straw—

Serrated Edge, per doz. \$5.75 to \$6.00

Iwan's Sickle Edge.....1/2 doz. \$9.50

Iwan's Serrated.....1/2 doz. \$10.00

Mincing—

Buffalo.....1/2 gro. \$13.00

Miscellaneous—

Farriers'.....doz. \$3.00 to \$3.25

Wostenholm's.....doz. \$3.00 to \$3.25

Knobs—Base, 2 1/2-inch, Birch, or Maple,
Rubber Tip.....gro. \$1.25 to \$1.40Carriage, Jap., all sizes.....
gro. 40¢ to 45¢

Door, Mineral.....doz. 65¢ to 70¢

Door, Por. Jap'd.....doz. 70¢ to 75¢

Door, Por. Nickel.....doz. \$2.05 to \$2.15

Bardale's Wood Door, Shutters, &c. 15%

Lacing, Leather—

See Belting, Leather—

Ladders, Store, &c.—Allith Mfg. Co., Reliable.....50%
Lyn's Store.....25%
Myers' Noiseless Store Ladders.....50%
Richards Mfg. Co.:
Improved Noiseless, No. 112.....50%
Climax Shelf, No. 113.....50%
Trolley, No. 109.....50%**Ladies, Melting—**L. & G. Mfg. Co. (low list).....25%
P. & W.....40&10%
Reading.....60%**Lanterns—Tubular—**Regular Tubular, No. 0.....
doz. \$4.25 to \$4.50Lift Tubular, No. 0.....
doz. \$4.75 to \$5.00Hinge Tubular, No. 0.....
doz. \$4.75 to \$5.00

Other Styles.....40 to 40&5%

Bull's Eye Police—

No. 1, 2 1/2-inch.....\$2.75 to \$3.00

No. 2, 3-inch.....\$3.00 to \$3.25

Lasts and Stands, Shoe—

Stowell's Atlas, Malleable Iron.....50%

Stowell's Badger, Cast Iron.....50%

Latches—Thumb—Roggin's Latches, with screw.....
doz. 35¢ to 40¢**Door—**Allith Mfg. Co., Automatic, No. 400,
1/2 doz. \$4.00Cronk & Carrier Mfg. Co., No. 101,
1/2 doz. \$2.90Cronk & Carrier Mfg. Co., Latch,
Hasp and Staples.....50%Richards' Bull Dog, Heavy, No. 123,
1/2 doz. \$5.00

Richards' Trump, No. 122.....\$1.50

Stowell's Steel.....50%

Leaders, Cattle—

Small.....doz. 50¢; large, 60¢

Covert Mfg. Co.:
Cotton, 45%; Hemp, 45%; Jute, 35%;
Sisal, 20%**Lifters, Transom—**

R. & E.....10%

Lines—

Wire Clothes, Nos. 18 19 20

100 feet.....\$2.25 2.00 1.75

75 feet.....\$1.75 1.55 1.10

Annisson Waterproof, 25 ft.,
1/2 gro. \$25.00; Gilt Edge \$25.00; Air
Line, \$23.00; Acme, \$18.00; Alabama,
\$17.00; Empire, \$16.00; Advance,
\$14.00; Eclipse, \$13.50; Chicago,
\$11.50; Standard, \$10.50; Columbia,
\$9.50; Allerton, \$13.50; Calhoun, \$12.00;
Samson Cordage Works:
Solid Braided Chalk, No. 0 to 3, 40%
Solid Braided Masons' Chalk, No. 0,
\$6.00; No. 1, \$6.50; No. 2, \$7.00; No. 3,
\$7.50;
Masons' Lines, Shade Cord, &c.:
White Cotton, No. 3 1/2, \$1.50; No. 4, 4,
\$2.00; No. 4 1/2, \$2.50; Colors, No. 3 1/2,
\$1.75; No. 4, \$2.25; No. 4 1/2, \$2.75;
Linen, No. 3 1/2, \$2.50; No. 4, \$3.50;
No. 4 1/2, \$4.50;
Tent and Awning Lines: No. 5,
White Cotton, \$7.50; Drab Cotton,
\$8.50;
Clothes Lines, White Cotton: 50 ft.,
\$2.75; 60 ft., \$3.25; 70 ft., \$

Reading 78.....	doz.	\$6.25
Rocking Table.....	doz.	\$6.25
Turn Table.....	doz.	\$6.25
White Mountain.....	doz.	\$6.00

Potato—		
Saratoga.....	doz.	\$7.00
White Mountain.....	doz.	\$6.00

Picks and Mattocks—		
List, Feb. 23, 1899.....	75¢/75¢45¢	
Cronk's Handled Garden Mattock,		
doz., No. 2, \$2.60; No. 3, \$2.40.		

Pinking Irons—		
See Irons, Pinking.		

Fins, Escutcheon—		
Brass.....	50¢/10¢/60¢	
Iron, list Nov. 11, '85.....	60¢/60¢/10¢	

Pipe, Cast Iron Soil—		
Carload lots.		
Standard, 2-6 in. 50¢/10¢/50¢/10¢45¢		
Extra Heavy, 2-6 in.	65¢/10¢	
Fittings.....	70¢/10¢/70¢/10¢45¢	

Pipe, Merchant—		
Consumers, Carloads.		
Steel.....		
Blk. Galv. Blk. Galv.		
1/2 & 3/4 in. 71¢ 55¢ 68¢ 52¢		
3/4 in. 73¢ 57¢ 70¢ 56¢		
1 in. 75¢ 59¢ 72¢ 60¢		
1 1/4 in. 79¢ 63¢ 76¢ 64¢		
2 to 12 in. 74¢ 59¢ 71 1/2¢ 56¢		

Pipe, Vitrified Sewer—		
Carload lots.		
Standard Pipe and Fittings, 3		
to 24 in., f.o.b. factory:		
First-class.....	85¢/86¢	
Second-class.....	90¢	
NOTE.—Market irregular.		

Pipe, Steel—		
Edwards' Nested.....	Per 100 joints.	
5 in., Standard Blue.....	\$6.25	\$7.25
6 in., Standard Blue.....	6.75	7.75
7 in., Standard Blue.....	7.75	8.25
5 in., Royal Blue.....	7.50	8.00
6 in., Royal Blue.....	8.50	9.50
7 in., Royal Blue.....	8.50	9.50

Planes and Plane Irons—		
Wood Planes—		
Bench, first qual.....	35¢/35¢/10¢	
Bench, second qual.....	45¢/45¢/10¢	
Molding.....	30¢/30¢/10¢	
Bailey's (Stanley R. & L. Co.).....	35¢/35¢/24¢	
Chapin-Stephens Co.:.....		
Bench, First Quality.....	35¢	
Bench, Second Quality.....	35¢	
Molding and Miscellaneous.....	30¢	
Toy and German.....	35¢	
Union.....	60¢	

Iron Planes—		
Bailey's (Stanley R. & L. Co.).....	35¢	
Chapin's Iron Planes.....	50¢/10¢	
Miscellaneous Planes (Stanley R. & L. Co.).....	30¢/35¢	
Union.....	60¢	

Plane Irons—		
Wood Bench Plane Ir.....	25¢/25¢/10¢	
Buck bro.....	30¢	
Chapin-Stephens Co.....	25¢	
Stanley R. & L. Co.....	25¢	
Union.....	20¢/25¢/25¢	
L. & J. White.....	20¢/25¢/25¢	

Planters, Corn, Hand—		
Kohler's Eclipse.....	doz.	\$8.00

Plates—		
Felice.....	1b. 4¢/14¢	
Self-Sealing Pie Plates (R. M. Co.).....	doz.	\$2.00

Pliers and Nippers—		
Button Pliers.....	75¢/10¢/75¢, 10, 5¢	
Gas Burner, per doz., 5 in., \$1.25		
\$1.30; 6 in., \$1.45; 8 in., \$1.50.		
Gas Pipe.....	7 8 10 12 in.	
\$2.00 \$2.25 \$2.75 \$3.50		
Acme Nippers.....	50¢/55¢	
Cronk & Carrier Mfg. Co.:.....	75¢/10¢	
American Button.....	75¢/10¢	
Cronk's.....	90¢	
Stub's Pattern.....	50¢	
Combination and others.....	33 1/2¢	
Heller's Farriers' Nippers, Pincers and Tools.....	40¢/50¢/40¢/10¢/5¢	
The Nettleton Mfg. Co. Reversible Cutting Nippers.....	40¢	
P. S. & W. L. Co. Tinner's Cutting Nippers.....	40¢	
Wm. Schollhorn Co.:.....		
Bernard, 33 1/2%; Elm City, 33 1/2%;		
Paragon, 50%; Lodi, 50%.		
Swedish Steel, End and Diagonal Cutting Pliers.....	50¢	
Utica Drop Forge & Tool Co.:.....		
Pliers and Nippers, all kinds.....	40¢	

Plumbs and Levels—		
Chapin-Stephens Co.:.....		
Plumbs and Levels.....	30¢/30¢/10¢/5¢	
Chapin's Imp. Brass Cor.	40¢/40¢/10¢	
Pocket Level.....	30¢/30¢/10¢/5¢	
Extension Sights.....	30¢/30¢/10¢/5¢	
Machinists' Levels.....	40¢/40¢/10¢	
Disston's Plumbs and Levels.....	67 1/2¢	
Disston's Pocket Levels.....	67 1/2¢	
C. E. Jennings & Co.'s Iron, Adjustable.....	40¢/75¢	
Stanley R. & L. Co.....	40¢/75¢	
Stanley's Duplex.....	30¢	
Woods' Extension.....	33 1/2¢	

Poachers, Egg—		
Buffalo Steam Egg Poachers, No. 3,		
No. 1, \$6.00; No. 2, \$5.00; No. 3,		
\$3.00; No. 4, \$12.00.....	50¢	

Points, Glaziers—		
Bulk and 1-lb. papers.....	1b. 70¢	
1 1/2-lb. papers.....	1b. 60¢/10¢4¢	
1/2-lb. papers.....	1b. 50¢/11¢	

Pokes, Animal—		
Ft. Madison Hawkeye.....	doz.	\$3.25
Ft. Madison Western.....	doz.	\$4.00

Police Goods—		
Manufacturers' Lists.....	25¢/25¢45¢	
Tower's.....	25¢	

Polish—Metal, Etc—		
Glasbrite, No. 2, 5 lb can (powder),		
each, \$1.25; doz., \$12.00; No. 2, 10 lb		
can (cake), each, \$2.50; doz., \$24.00.		
Prestoline Liquid, No. 1 (1/4 pt.).....		
doz., \$3.00; No. 2 (1 qt.), \$9.00.....	40¢	
Prestoline Paste.....	40¢	
George William Hoffman:		
U. S. Metal Polish Paste, 3 oz.		
boxes, doz., 50¢; doz., \$4.50.		
1/4 lb boxes, doz., \$1.25; 1 lb		
boxes, doz., \$2.25.		
U. S. Liquid, 8 oz. cans, doz.,		
\$1.25.		
Barkeepers' Friend Metal Polish, doz.,		
\$1.75.		
Wynn's White Silk, 1/2 pt. cans, doz.,		
\$2.00.		

Stove—		
Black Eagle Benzine Paste, 5 lb cans,		
doz., \$1.00.		
Black Eagle, Liquid, 1/4 pt. cans,		
doz., \$1.00.		
Black Jack Paste, 1/2 lb cans, doz., \$9.00.		
Black Kid Paste, 5 lb can.....	each, \$0.65	
Ladd's Black Beauty Liquid, per		
100 tins.....	\$4.75	
Joseph Dixon's, doz., \$3.75.....	10¢	
Dixon's Plumbago.....	doz., \$2.50	
Firestone.....	doz., \$2.50	
Gem, doz., \$4.50.....	10¢	
Japanese.....	doz., \$3.50	
Jet Black.....	doz., \$3.50	
Peerless Iron Enamel, 10 oz. cans,		
doz., \$1.50.		
Wynn's:		
Black Silk, 5 lb pail.....	each, 70¢	
Black Silk, 1/4 lb box.....	doz., \$1.00	
Black Silk, 5 oz. box.....	doz., \$0.75	
Black Silk, 1/2 pt. liq.....	doz., \$1.00	

Peppers, Corn—		
1 qt., Square.....	gro.	\$3.00
1 qt., Round.....	gro.	\$9.00
1/2 qt., Square.....	gro.	\$10.00
2 qt., Square.....	gro.	\$12.00

Post Hole and Tree Augers and Diggers—		
See also Diggers, Post Hole, &c.		

Posts, Steel—		
Steel Fence Post, each, 5 ft., 42¢;		
6 ft., 46¢; 6 1/2 ft., 48¢.		
Steel Hitching Posts.....	each	\$1.30

Potato Parers—		
See Parers, Potato.		

Pots, Glue—		
Enameled.....	40¢	
Tinned.....	35¢	

Powder—		
In Canisters:		
Duck, 1 lb.....	each	45¢
Fine Sporting, 1 lb.....	each	75¢
Rifle, 1/2 lb.....	each	15¢
Rifle, 1-lb.....	each	25¢

In Kegs:		
12 1/2-lb. kegs.....	\$3.50	
25-lb. kegs.....	\$4.50	
King's Semi-Smokeless:		
Keg (25 lb bulk).....	\$6.50	
Half Keg (12 1/2 lb bulk).....	\$3.50	
Quarter Keg (6 1/2 lb bulk).....	\$1.90	
Case 24 (1 lb cans bulk).....	\$8.50	
Half case (1 lb cans bulk).....	\$4.50	
King's Smokeless: Shot Gun, Rifle.		
Keg (25 lb bulk).....	\$12.00 \$15.00	
Half Keg (12 1/2 lb bulk).....	6.25 7.75	
Quarter Keg (6 1/2 lb bulk).....	3.25 4.00	
Case 24 (1 lb cans bulk).....	14.00 17.00	
Half case 12 (1 lb c. bk.).....	7.25 8.75	
Robin Hood Sm'less Shot Gun.....	50¢/20¢	

Presses—		
Fruit and Jelly—		
Enterprise Mfg. Co.....	20¢/25¢	

Seal Presses—		
Morrill's No. 1, doz., \$20.00.....	50¢	

Pruning Hooks and Shears		
See Shears.		

Pullers, Nail—		
Cyclops.....	50¢	
Miller's Falls, No. 3, doz., \$12.00.		
Morrill's No. 1, Nail Puller, doz.,		
\$20.00.....	50¢	
Pearson No. 1, Cyclops Spike Puller,		
each \$30.00.....	50¢	
Scranton, Case Lots:		
No. 2B (large).....	\$5.50	
No. 3B (small).....	\$5.00	
Smith & Hemenway Co.:.....		
Diamond B. case lots, doz., Large,		
\$9.00; Small, \$7.50.		
Giant No. 1, doz., \$18; No. 1 1/2,		
\$16.50; No. 3, \$15.....	33 1/2¢	
Staple Pullers, Utica and Davison,		
Parrot Tack and Stub Puller, doz.,		
75¢; doz., \$6.00.		

Pulleys, Single Wheel—		
Inch.....	1 1/2 1 3/4 2 3	
Awning or Tackle,		
doz., \$0.30 \$1.30 \$1.60 1.05		
Hay Fork, Sichel or Solid Eye,		
doz., 1/2 in., \$1.25; 5 in., \$1.55		
Inch.....	2 2 1/2 2 1/2	
Hot House, doz., \$0.65 \$1.80		
Inch.....	1 1/4 1 1/2 1 3/4	
Screw, doz., \$0.16 \$1.79 \$3.30		
Inch.....	1 1/4 1 1/2 1 3/4	
Side, doz., \$0.25 \$1.40 \$3.30		
Inch.....	1 1/4 1 1/2 1 3/4	
Stowell's:		
Ceiling or End, Anti-Friction.....	60¢/10¢	
Dumb Waiter, Anti-Friction.....	60¢/10¢	
Electric Light.....	60¢	
Side, Anti-Friction.....	60¢/10¢	

Sash Pulleys—		
Common Frame: Squares or		
Round End, per doz, 1 1/2 and		
2 in.....	10¢/19¢	

Auger Mortise, no Face Plate.		
per doz., 1 1/2 and 2 in.....	17¢/19¢	
Acme.....	1 1/2 in., 16¢; 2 in., 19¢	
For All-Steel, Nos. 3 and 1, 2 in.,		
doz., 50¢.		
Grand Rapids All Steel Noiseless.....	50¢	
Ideal.....	70¢/5¢	
Niagara.....	1 1/2 in., 16¢; 2 in., 19¢	
No. 26, Troy.....	1 1/2 in., 16¢; 2 in., 19¢	
Star.....	1 1/2 in., 16¢; 2 in., 19¢	
Tackle Blocks—See Blocks.		

Pumps—		
Cistern.....	60¢/60¢/10¢	
Pitcher Spout.....	80¢/80¢/10¢	
Wood Pumps, Tubing, &c.....	45¢/50¢	
Barnes Dbl. Acting (low list).....	50¢	
Barnes' Pitcher Spout.....	75¢/10¢45¢	
Contractors' Rubber Diaphragm No.		
2, B. & L. Block Co.....	\$18.00	
Daisy Spray Pump.....	doz., \$4.50	
Flint & Walling's Fast Mail Hand		
(low list).....	55¢	
Flint & Walling's Fast Mail (low		
list).....	55¢/5¢	
Flint & Walling's Tight Top Pitcher.....	50¢	
National Specialty Mfg. Co. Measur-		
ing, Nos. 2, \$6.00; 3, \$6.50.....	30¢	
Myers' Pumps (low list).....	50¢	
Myers' Power Pumps.....	50¢	
Myers' Spray Pumps.....	50¢	

Pump Leathers—		
Plunger and Lower Valve—Per		
gro.:.....		
Inch.....	2 1/4 2 1/2 2 3/4	
\$2.80 2.50 2.75 3.00		
Inch.....	3 3 1/4 3 1/2 3 3/4	
\$3.50 3.60 3.85 4.10 4.40		
Plunger Cup Leathers—Per 100:		
Inch.....	2 1/2 2 3/4 3 3/4 4	
\$2.75 3.85 5.00 6.00		

Punches—		
Saddlers' or Drive, good.....	doz., 50¢/75¢	
Spring, single tube, good qual-		
ity.....	\$1.75/\$2.00	
Revolving (4 tubes).....	doz., \$3.50/\$3.75	
Bemis & Call Co.'s Cast St'l Drive.....	50¢	
Bemis & Call Co.'s Check.....	50¢	
Morrill's Nos. 1AA, 1A, 1B, 1C,		
\$15.00.....	50¢	
Hercules, 1 die, each \$5.00.....	50¢	
Niagara Hollow Punches.....	40¢	
Niagara Solid Punches.....	55¢/10¢	
Wm. Schollhorn Co.:.....		
Belt and Ticket, Bernard, 33 1/4%;		
Paragon, 50%; Lodi.....	50¢	
Steel Screw, B. & K. Mfg. Co.....	50¢	
Tinner's Hollow, P. S. & W. Co. 33 1/4%		
Tinner's Solid, P. S. & W. Co.,		
doz., \$1.44.....	50¢	

Rail—Barn Door, &c.—		
Sliding Door, Painted Iron.....	2 1/4¢/2 3/4¢	

Sliding Door, Wrought Brass,		
1 1/2 in., lb., 36¢.....	30¢	
Allith Mfg. Co.: Reliable Hanger		
Track.....	50¢	
Cronk's:		
Double Braced Steel Rail, 1/2 ft. 2 1/2 c		
O. N. T. Rail.....	2 1/2¢	
Griffin:		
xxx, 100 ft., 1 x 3-16 in., \$3.00;		
1 1/4 x 3-16 in., 3.50.		
Hinged Hanger, 100 ft., 1 x 3-16		
in., \$3.10; 1 1/4 x 3-16 in., \$3.80.		
Lane's:		
Hinged Track, 100 ft., 1 in., \$3.40;		
1 1/4 in., \$3.96.		
O. N. T., 100 ft., 1 in., \$3.00; 1 1/4		
in., \$3.60; 1 1/2 in., \$4.00.		
Standard, 1 1/4 in.....	100 ft. \$4.00	

Rules

Boxwood	60@60&10%
Ivory	35@10@35&10&5%
Chapin-Stephens Co.	
Boxwood	60%
Flexiford	27%&10%
Ivory	35@35&10&10%
Miscellaneous	50@50&10&10%
Stephens' Combination	55@55&10%
Stationers'	10@10&10%
Keuffel & Esser Co.	
Folding Wood	35&10%
Folding Steel	35&10%
Lufkin's Steel	50&10%
Lufkin's Lumber	60%
Stanley R. & L. Co.	
Boxwood	60%
Ivory	45%
Miscellaneous	40%
Zig Zag, Pin Joint	42&5%
Upon Nut Co.	
Boxwood	60@60&10%
Ivory	35&10&35&10&10%

Sash Balances—

See Balance, Sash.

Sash Locks—

See Locks, Sash.

Sash Weights—

See Weights, Sash.

Sausage Stuffers or Fillers

See Stuffers or Fillers, Sausage.

Saw Frames—

See Frames, Saw.

Saw Sets—See Sets, Saw.**Saw Tools—See Tools, Saw.****Saws—**

Atkins'	
Circular	50%
Band	50&10@60%
Cross Cut	35&5%
Mulay, Mill and Drag	50%
One-Man Saw, 40%; Wood Saws, 40%; Hand, Compass, &c., 40%.	
Chapin-Stephens Co.	
Turning Saws and Frames	30@30&10%
Diamond Saw & Stamping Works	
Sterling Kitchen Saws	30&10&10%
Diston's	
Circular, Solid and Ins'ted Tooth	50%
Band, 2 to 14 in. wide	40%
Hand, 14 to 18 in.	45%
Crosscuts	45%
Narrow Crosscuts	60%
Mulay, Mill and Drag	50%
Framed Woodsaws	25%
Woodsaw Rods	25%
Hand Saws, Nos. 12, 9, 8, 16, 4100	25%
12, 12, 7, 7, 6	25%
Hand Saws, Nos. 7, 107, 107 1/2, 3, 1	25%
0, 0, Combination	25%
Compass, Key Hole, &c.	25%
Butcher Saws and Blades	30%
O. E. Jennings & Co.	
Back Saws	25%
Butcher Saws	30%
Compass and Key Hole Saws	30&5%
Framed Wood Saws	25%
Hand Saws	25&5%
Wood Saw Blades	25%
Millers Falls	
Butcher Saws	15&10%
Star Saw Blades	15&10%
Massachusetts Saw Works	
Victor Kitchen Saws	10&10&50%
Butcher Saws Blades	35%
Peace & Richardson's Hand Saws	30%
Simonds'	
Circular Saws	50%
Crescent Ground Cross Cut Saws	35%
One-Man Cross Cuts	40&10%
Gang Mill, Mulay and Drag Saws	50%
Band Saws	25&5%
Back Saws	25&5%
Butcher Saws	30&35&10%
Hand Saws	25&5%
Hand Saws, Bay State Brand	40%
Compass, Key Hole, &c.	25&5%
Wood Saws	10&10%
Wheeler, Madden & Clemens Mfg. Co.'s Cross Cut Saws	50%

Hack Saw Blades and Frames—

Atkins' Hack Saw Blades A & A	25%
Diston's	
Concave Blades	25%
Keystone Blades	25%
Hack Saw Frames	25%
Pittsburg File Works, The Best	30%
O. E. Jennings & Co.	
Hack Saw Frames, Nos. 175, 180	40&7&5%
Hack Saws, Nos. 175, 180, complete	40&7&5%
Goodell's Hack Saw Blades	40%
Griffin's Hack Saw Blades	35&4&10%
Star Hack Saws and Blades	15&10%
Sterling Hack Saw Blades	30&10&5%
Sterling Hack Saw Frames	30&10&10%
Sterling Power Hack Saw Machines	
each, No. 1, \$25.00; No. 2, \$30.00	10%
Victor Hack Saw Blades	25%
Victor Hack Saw Frames	40%

Scroll—

Barnes, No. 7, \$15	40%
Barnes' Scroll Saw Blades	40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, \$18	20%
with boring attachment, \$20	20%
Lester, complete, \$10.00	15&10%
Rogers, complete, \$3.50 and \$4.00	15&10%

Scales—

Family, Turnbull's	50@50&10%
Counter	
Hatch, Platform, 1/4 oz. to 5 lbs.	dos. \$5.50
Two Platforms, 1/4 oz. to 5 lbs.	dos. \$18.00
Union Platform, Plain	\$1.70@2.10
Union Platform, Stpd.	\$1.85@2.15
Chatillon's	
Favorite	25%
Crocker's Trip Scales	40%
Chicago Scale Co.	
The Little Detective	25% 2s 50c
Union or Family No. 3	50%
Portable Platform (reduced list)	50%
Wagon or Stock (reduced list)	50%
The Standard Portables	45%
The Standard R. R. and Wagon	50&10%

Scrapers—

Box, 1 Handle	dos. \$2.00@2.25
Box, 2 Handle	dos. \$2.50@2.60
Ship	Light, \$2.00; Heavy, \$4.50
Adjustable Box Scraper (S. R. & L. Co.), \$6.00	45%
Chapin-Stephens Co., Box	30&30&10&10%

Screws—Bench and Hand

Bench, Iron, doz., 1 in.	\$2.50@
2 1/2; 1 1/2, \$3.00@3.25; 1 1/4, \$3.50@3.75	
Bench Wood	25@25&5%
Hand, Wood	25@25&5%
R. Bliss Mfg. Co., Hand	30&10%
Chapin-Stephens Co., Hand	25%

Coach, Lag and Hand Rail—

Lag, Cone Point, list Oct. 1, '99	75&15%
Coach, Gimlet Point, list Oct. 1, '99	75&10%
Hand Rail, list Jan. 1, '81	70&10@75%

Jack Screws—

Standard List	75%
Millers Falls	50&10&10%
P. S. & W.	30%
Swett Iron Works	75&80%

Machine—

List Jan. 1, '98:	
Flat or Round Head, Iron	50&50&10%
Flat or Round Head, Brass	50&50&10%

Set and Cap—

Set (Iron)	80&7 1/2%
Set (Steel), net advance over Iron	25%
Sq. Hd. Cap	75&10&7 1/2%
Hex. Hd. Cap	75&10&7 1/2%
Rd. Hd. Cap	60&10%
Fillister Hd. Cap	60&10&10%

Wood—

List July 23, 1905.	
Flat Head, Iron	87 1/2&10&10%
Round Head, Iron	85&10&10%
Flat Head, Brass	82 1/2&10%
Round Head, Brass	80&10&10%
Flat Head, Bronze	77 1/2&10&10%
Round Head, Bronze	75&10&10%
Drive Screws	87 1/2&10%

Scroll Saws—

See Saws, Scroll.	
Scythes—	
Grass, No. 1, Plain	\$6.25@6.75
Clipper, Bronzed Webb	\$6.50@7.00
No. 3 Clipper, Pol'd Webb	\$6.75@7.25
No. 6 Clipper and Solid Steel	\$7.00@7.50
Bush, Weed and Bramble, No. 2	\$6.50@7.00
Grain, No. 1	\$8.25@8.75
Bronzed Webb, No. 1	\$8.50@9.00
Nos. 3 and 4 Clipper, Grain	\$8.75@9.25
Solid Steel, No. 6	\$9.25@9.75

Seeders, Raisin—

Enterprise	25@30%
Sets—Awl and Tool—	
Fray's Adj. Tool Handles, Nos. 1, \$12; 2, \$18; 3, \$12; 4, \$9; 5, \$7	50%
C. E. Jennings & Co.'s Model Tool Holders	30%
Millers Falls Adj. Tool Handles, No. 1, \$12; No. 4, \$12; No. 5, \$18	15&10%

Garden Tool Sets—

Ft. Madison Three Plows, Hoe, Rake and Shovel	dos sets \$9.00
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Sets, Nail—

Octagon	gro. \$3.50@3.75
Buck Bros.	27 1/2%
Cannon's Diamond Point	gro. \$12.10
Mayhew's	gro. \$12.30
Snell's Corrugated, Cup Pt.	gro. \$7.20
Snell's Knurled, Cup Pt.	gro. \$7.20
Victor Knurled Cup Pt.	gro. \$7.50

Rivet—

Regular list	75@75&10%
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Saw—

Atkin's	
Criterion	40%
Adjustable	40%
Bemis & Call Co.'s	
Cross Cut	30%
Plate	20%
Diston's Star, Monarch and Triumph	30%
Morrill's No. 1	\$15.00
Nos. 3 and 4, Cross Cut	\$20.60
No. 5, Mill	\$30.00
Nos. 10, 11, 95	\$15.60
No. 1 Old Style	\$10.00
Special	\$16.25
Giant Royal Cross Cut	dos. \$8.00
Royal, Hand	dos. \$4.50
Taintor Positive	dos. \$6.75

Shaving—

Fox Shaving Sets, No. 30	dos. \$21.00
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Smith & Hemenway Co.'s	60%
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Sharpeners, Knife—

Chicago Wheel & Mfg. Co.	70%
Pike Mfg. Co.	
Fast Cut Pocket Knife Hones	\$1.50
Mounted Kitchen Sand Stone	\$1.50
3 doz.	\$1.50
Natural Grit Carring Knife Hones, 3 doz.	\$3.00
Quick Cut Emery Carring Knife Hones, 3 doz.	\$1.50
Quick Edge Pocket Knife Hones, 3 doz.	\$2.50

Skate—

Smith & Hemenway Co., Eureka	20%
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Shaves, Spoke—

Iron	dos. \$1.10@1.25
Wood	dos. \$1.75@2.25
Bailey's (Stanley R. & L. Co.)	45%
Razor Edge (Stanley R. & L. Co.)	55%
Iron, 50%; Wood	55%
Chapin-Stephens Co.	30&30&10&10%
Goodell's, 3 doz.	\$9.00
Wood's F1 and F2	50%

Shears—

Cast Iron	7	8	9 in.
Best	\$16.00	18.00	20.00 gro.
Good	\$13.00	15.00	17.00 gro.
Cheap	\$5.00	6.00	7.00 gro.

Straight Trimmers, &c.—

Best quality Jap.	70@70&10%
Best quality, Nickel	60@60&10%
Fair quality, Jap.	80@80&5%
Fair quality, Nickel	75@75&10%
Tailors' Shears	40@40&10%
Acme Cast Shears	40@40&5%
Heinrich's Tailor's Shears	10%
Wilkinson Shear & Cutlery Co.	
Sheep, 1900 list	30&10&5%
Grass	50&10%
Horse or Mule	50&10%

Tinners' Snips—

Steel Blades	20&5@20&10%
Steel Laid Blades	40&10@50%
Forged Handles, Steel Blades, Berlin	

Heinrich's Snips	50%
Jennings & Griffin Mfg. Co.'s, 6 1/2 to 10 in.	50%
Niagara Snips	40%
P. S. & W. Forged Handles	20%

Pruning Shears—

Cronk's Hand Shears	33 1/2%
Cronk's Wood Handle Shears	33 1/2%
Diston's Combined Pruning Hook and Saw, 3 doz.	\$18.00
Diston's Pruning Hook only, 3 doz.	\$12.00
John T. Henry Mfg. Co.	
Pruning Shears, all grades	50%
P. S. & W. Co.	30%
Wilkinson Shear & Cutlery Co.	
Hedge, Wilcox Brand	60&10%
Lawn and Border	60&10%

Sheaves—Sliding Door—

Stowell's Anti-Friction	50%
Reading	40%
R. & E. list	15%
Wrightsville Hatfield Pattern	30%

Sliding Shutter—

Reading list	40%
R. & E. list	10%

Shells—Shells, Empty—

Brass Shells, Empty	
Climax, Club, Rival, 10 and 12	6&5%
Paper Shells, Empty	
Acme, Ideal, Leader, New Rapid, Magic, 10, 12, 16 and 20 gauge	2&5%
Blue Rival, New Climax, Challenge, Monarch, Defiance, Repeater, Yellow Rival, 10, 12, 16 and 20 gauge	20%
Climax, Union, League, New Rival, 10 and 12 gauge	25%
Climax, Union, League, New Rival, 14, 16 and 20 gauge	20%
Expert, Metal Lined and Pigeon, 10, 12, 16 and 20 gauge	35&5%
Robin Hood, Low Brass	20&5%
Robin Hood, High Brass	30&5%
Indian, for Black Powder	25&5%

Shells, Loaded—

Loaded with Black Powder	40%
Loaded with Smokeless Powder, medium grade	40&5%
Loaded with Smokeless Powder, high grade	40&10&10%
Robin Hood Smokeless Powder	
Robin Hood, Low Brass	50%
Comets, High Brass	50&10&5%
Indian, Black Powder	40&5%

Shingles, Metal—Per Sq.

Edwards Mfg. Co.	
Tin Galvanized	
14 x 20	C. L. \$1.25
10 x 14	L. C. L. \$1.00
7 x 10	4.50
Wheeling Corrugating Co.	4.75

Shoes, Horse, Mule, &c.—

F.o.b. Pittsburgh:	
Iron	per keg \$4.00
Steel	per keg \$3.75
Burden's, all sizes	per keg \$3.90
Shot—	
25-lb. bag	
Drop, up to B	\$1.90
Drop, B and larger	2.15
Buck	2.15
Chilled	2.15
Dust	2.35

Shovels and Spades—

Association List, Nov. 15, 1902	40%
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Snow Shovel—

Long Handle	\$2.75@3.00
Wood and Mail, D. Handle	\$3.25@3.50

Sieves and Sifters—

Hunter's Imitation	gro. \$9.50@10.00
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Hunter's Genuine—

per gro. \$12.00@12.50	
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Buffalo Metallic Blued, R. M. Co., 14&16

14&16	14&20
13.20	13.50

Sieves, Seamless Metallic

Per dozen	
Mesh	14 18 30
Iron Wire	\$1.05 1.05 1.10 1.20
Tinned Wire	\$1.15 1.15 1.20 1.30

Sieves, Wooden Rim—

Nested, 10, 11 and 12 Inch	
Mesh 18, Nested	dos. \$0.90@0.95
Mesh 20, Nested	dos. \$1.00@1.05
Mesh 24, Nested	dos. \$1.30@1.40

Sinks, Cast Iron—

Painted, Standard list:	
12 x 12 to 22 x 36 in.	60&5%
20 x 40 to 24 x 50 in.	55%
24 x 60 to 24 x 120 in.	55%

Barnes' low list

Tinned Wire..	\$1.15	1.15	1.20	1.30
Sieves, Wooden Blm—				

Scythe Stones—

Chicago Wheel & Mfg. Co.	
Gena Corundum, 10 in., \$8.00	per doz.
gro., 12 in., \$10.80	
Norton Emery Scythe Stones:	
Less than gross lots.....	per doz.
One gross or more.....	per doz.
Lots of 10 gross or more.....	per doz.
Pike Mfg. Co., 1901 list:	
Black Diamond S. S., 8 in., \$12.00	per doz.
Lamolle S. S., 8 in., \$11.00	per doz.
White Mountain S. S., 8 in., \$9.00	per doz.
Green Mountain S. S., 8 in., \$8.00	per doz.
Extra Indian Pond S. S., 8 in., \$7.50	per doz.
No. 1 Indian Pond S. S., 8 in., \$7.00	per doz.
No. 2 Indian Pond S. S., 8 in., \$6.50	per doz.
Leader Red End S. S., 8 in., \$4.50	per doz.
Quick Cut Emery.....	per doz.
Pure Corundum.....	per doz.
Crescent.....	per doz.
Emery Scythe Rifles, 2 Coat, \$8	per doz.
Emery Scythe Rifles, 3 Coat, \$10	per doz.
Emery Scythe Rifles, 4 Coat, \$12	per doz.
Balance of 1904 list 3 1/4%	

Stoppers, Bottle—

Victor Bottle Stoppers.....	per doz.
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Stops—Bench—

Millers Falls.....	per doz.
Morrill's, No. 1, \$10.00.....	per doz.
Morrill's, No. 2, \$12.50.....	per doz.

Door—

Chapin-Stephens.....	per doz.
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Plane—

Chapin-Stephens.....	per doz.
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Straps—Box—

Cary's Universal, case lots.....	per doz.
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Stretchers, Carpet—

Cast Iron, Steel Points, doz.....	per doz.
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Socket.....	per doz.
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Bullard, per doz.....	per doz.
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Excelsior Stretcher and Tack Hammer Combined, per doz.....	per doz.
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Strops, Razor—

Star Diamond Strop.....	per doz.
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Stuffers, Sausage—

Enterprise Mfg. Co.....	per doz.
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National Specialty Co., list Jan. 1, 1902.....	per doz.
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Sweepers, Carpet—

National Sweeper Co., per doz.....	per doz.
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Louis XV, Roller Bearing, Gold Plated.....	per doz.
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Hepplewhite, Roller Bearing, Silver Plated.....	per doz.
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Sheraton, Roller Bearing, N'kel.....	per doz.
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Ye Mission, Roller Bearing, Oxidized Coppered.....	per doz.
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Transparent, Roller Bearing, Plate Glass top, Nickel.....	per doz.
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National Queen, Roller Bearing, Fancy Veneers.....	per doz.
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Loyal, Roller Bearing, Veneers, Nickel.....	per doz.
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Triple Medal, Roller Bearing, Nickel.....	per doz.
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Marion, Roller Bearing, Nickel.....	per doz.
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Monarch, Roller Bearing, N'kel.....	per doz.
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Perpetual, Regular B'rs, N'kel.....	per doz.
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Perpetual, Regular B'rs, Jap.....	per doz.
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Monarch Extra (17 in. case), Roller Bearing, Nickel.....	per doz.
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Monarch Extra (17 in. case), Roller Bearing, Japanned.....	per doz.
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Auditorium (25 in. case), Roller Bearing, Nickel.....	per doz.
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Mammoth (30 in. case), Roller Bearing, Nickel.....	per doz.
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NOTE.—Rebates: 50c per dozen on three-dozen lots; \$1 per dozen on five-dozen lots; \$2 per dozen on ten-dozen lots; \$3.50 per dozen on twenty-five-dozen lots.	
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Streator Metal Stamping Co.	
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Eureka Japanned.....	per doz.
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Model E, Sanitaire.....	per doz.
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Model A, Sterling.....	per doz.
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Model B, Sterling, Nickel.....	per doz.
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Model B, Sterling, Japanned.....	per doz.
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Model C, Sterling.....	per doz.
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Model D, Sterling.....	per doz.
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NOTE.—The above prices are for Standard Weights. An extra 5% is given on Medium Weights, and an extra 10% is given on light weights.	
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Tacks, Finishing Nails, &c.

New List, May 1, 1905.	
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American Carpet Tacks.....	per doz.
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American Cut Tacks.....	per doz.
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Swedes Cut Tacks.....	per doz.
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Swedes Upholsterers'.....	per doz.
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Gimp Tacks.....	per doz.
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Lace Tacks.....	per doz.
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Trimmers' Tacks.....	per doz.
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Looking Glass Tacks.....	per doz.
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Bill Posters' and Railroad Tacks.....	per doz.
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Hungarian Nails.....	per doz.
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Finishing Nails.....	per doz.
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Trunk and Clout Nails.....	per doz.
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NOTE.—The above prices are for Standard Weights. An extra 5% is given on Medium Weights, and an extra 10% is given on light weights.	
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Miscellaneous—

Double Pointed Tacks.....	per doz.
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See also Nails, Wire.	
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Tanks, Oil—

Emerald, R. M. Co.....	per gal.
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Emerald, R. M. Co.....	per gal.
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Queen City, R. M. Co.....	per gal.
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Queen City, R. M. Co.....	per gal.
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Tapes, Measuring—

American Ases' Skin.....	per yd.
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Patent Leather.....	per yd.
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Steel.....	per yd.
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Chesterman's.....	per yd.
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Keuffel & Esser Co.....	per yd.
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Favorite, Ass Skin.....	per yd.
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Favorite, Duck and Leather.....	per yd.
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Metallic and Steel, lower list, 35% 3 1/2%; Pocket, 35% 3 1/2%.	
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Luffin's:	
Asses' Skin.....	per yd.
Metallic.....	per yd.
Patent Bend, Leather.....	per yd.
Pocket.....	per yd.
Steel.....	per yd.
Wiebusch & Hilger:	
Chesterman's Metallic, No. 31L, etc.....	per yd.
Chesterman's Steel, No. 10381, etc.....	per yd.

Teeth, Harrow—	
Steel Harrow Teeth, plain or headed, 1/2-inch and larger.....	per 100 lbs.

Thermometers—	
Tin Case.....	per doz.

Ties, Bale—Steel Wire—	
Single Loop.....	per doz.

Monitor, Cross Head, do.....	per doz.
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Brick Ties—	
Niagara Brick Ties.....	per doz.

Tinner's Shears, &c.—	
See Shears, Tinner's, &c.	

Tinware—	
Stamped, Japanned and Pieced, sold very generally at net prices.	

Tire Benders, Upsetters, &c.	
See Benders and Upsetters, Tire.	

Tools—Coopers'—	
L. & L. J. White.....	per doz.

Hay—	
Myers' Hay Tools.....	per doz.

Stowell's Hay Carriers.....	per doz.
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Forks, 50%; Fork Pulleys, 50%.	
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Miniature—	
Smith & Hemenway Co's, David-son.....	per doz.

Saw—	
Atkins' Cross Cut Saw Tools.....	per doz.

Simonds' Improved.....	per doz.
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Simonds' Crescent.....	per doz.
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Ship—	
L. & L. J. White.....	per doz.

Transom Lifters—	
See Lifters, Transom.	

Traps—Fly—	
Balloon, Globe or Acme, doz.....	per doz.

Simonds' Improved.....	per doz.
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Harper, Champion or Paragon, doz.....	per doz.
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Imitation Oneida.....	per doz.
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Newhouse.....	per doz.
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Hawley & Norton.....	per doz.
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Victor.....	per doz.
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Oneida.....	per doz.
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Mouse and Rat—	
Mouse, Wood, Choker, doz. holes.....	per doz.

Mouse, Round or Square Wire, doz.....	per doz.
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Marty French Rat and Mouse Trap (Genuine):	
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No. 1, Rat, each \$1.21; per doz.....	per doz.
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No. 3, Rat, per doz.....	per doz.
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No. 3 1/2, Rat, per doz.....	per doz.
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No. 4, Mouse, per doz.....	per doz.
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No. 5, Mouse, per doz.....	per doz.
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Trimmers, Spoke.....	per doz.
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Wood's E. I.....	per doz.
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Trowels—	
Diston Brick and Pointing.....	per doz.

Diston Plastering.....	per doz.
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Diston "Standard Brand" and Garden Trowels.....	per doz.
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Kohler's Steel Garden Trowels, per doz.....	per doz.
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5 in., \$4.80; 6 in., \$6.00.	
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Never-Break Steel Garden Trowels.....	per doz.
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Rose Brick and Plastering.....	per doz.
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Woodrough & McFarlin, Plastering.....	per doz.
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Trucks, Warehouse, &c.—	
B. & L. Block Co.: New York Pattern.....	per doz.

Western Pattern.....	per doz.
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Handy Trucks.....	per doz.
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Grocery.....	per doz.
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Daisy Stove Trucks, Improved Pattern.....	per doz.
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McKinney Trucks.....	per doz.
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Model Stove Trucks.....	per doz.
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Tubs, Wash—No. 1 & 2	
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Galvanized, per doz.....	per doz.
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Galvanized Wash Tubs (R. M. Co.): No. 1, 2, 3, 10, 20, 30	
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Per doz., net.....	per doz.
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Twine, Miscellaneous—	
Flax Twine:	

No. 9, 1/4 and 1/2-lb. Balls.....	per doz.
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No. 12, 1/4 and 1/2-lb. Balls.....	per doz.
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No. 18, 1/4 and 1/2-lb. Balls.....	per doz.
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No. 24, 1/4 and 1/2-lb. Balls.....	per doz.
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No. 36, 1/4 and 1/2-lb. Balls.....	per doz.
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Chalk Line, Cotton.....	per doz.
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Balls.....	per doz.
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Cotton Mops, 6, 9, 12 and 15 lb. to doz.....	per doz.
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Cotton Wrapping, 5 Balls to lb., according to quality.....	per doz.
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American 2-Ply Hemp, 1/4 and 1/2-lb. Balls.....	per doz.
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American 3-Ply Hemp, 1-lb. Balls.....	per doz.
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India 2-Ply Hemp, 1/4 and 1/2-lb. Balls (Spring Twine).....	per doz.
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India 3-Ply Hemp, 1-lb. Balls.....	per doz.
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India 3-Ply Hemp, 1 1/2-lb. Balls.....	per doz.
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E. S. J. and 5-Ply Jute, 1-lb. Balls.....	per doz.
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Mason Line, Linen, 1/2-lb. Balls.....	per doz.
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No. 26, Mattress, 1/4 and 1/2-lb. Balls.....	per doz.
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Wool, 3 to 6 ply.....	per doz.
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Vises—	
Solid Box.....	per doz.

Parallel—

Athol Machine Co.:	
Simmons' Adjustable.....	per doz.
Standard.....	per doz.
Amateur.....	per doz.
Columbian Hdw. Co.....	per doz.
Emmert Universal:	

Pattern Makers' No. 1, \$15.00; No. 2, \$12.50.	
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Machinist and Tool Makers' No. 4A, \$12.50; No. 6A, \$10.00; No. 10A, \$22.50.	
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Presto Quick Acting, Adjustable Jaw, 2 1/2 to 25 1/2; Solid Jaw.....	per doz.
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Tiger Machinists.....	per doz.
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Fisher & Norris Double Saw.....	per doz.
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Holland's.....	per doz.
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Machinists.....	per doz.
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Keystone.....	per doz.
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Lewis Tool Co.:	
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Adjustable Jaw.....	per doz.
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Monarch, 50%; Solid Jaw.....
